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September 1990 Vol. X No. 2

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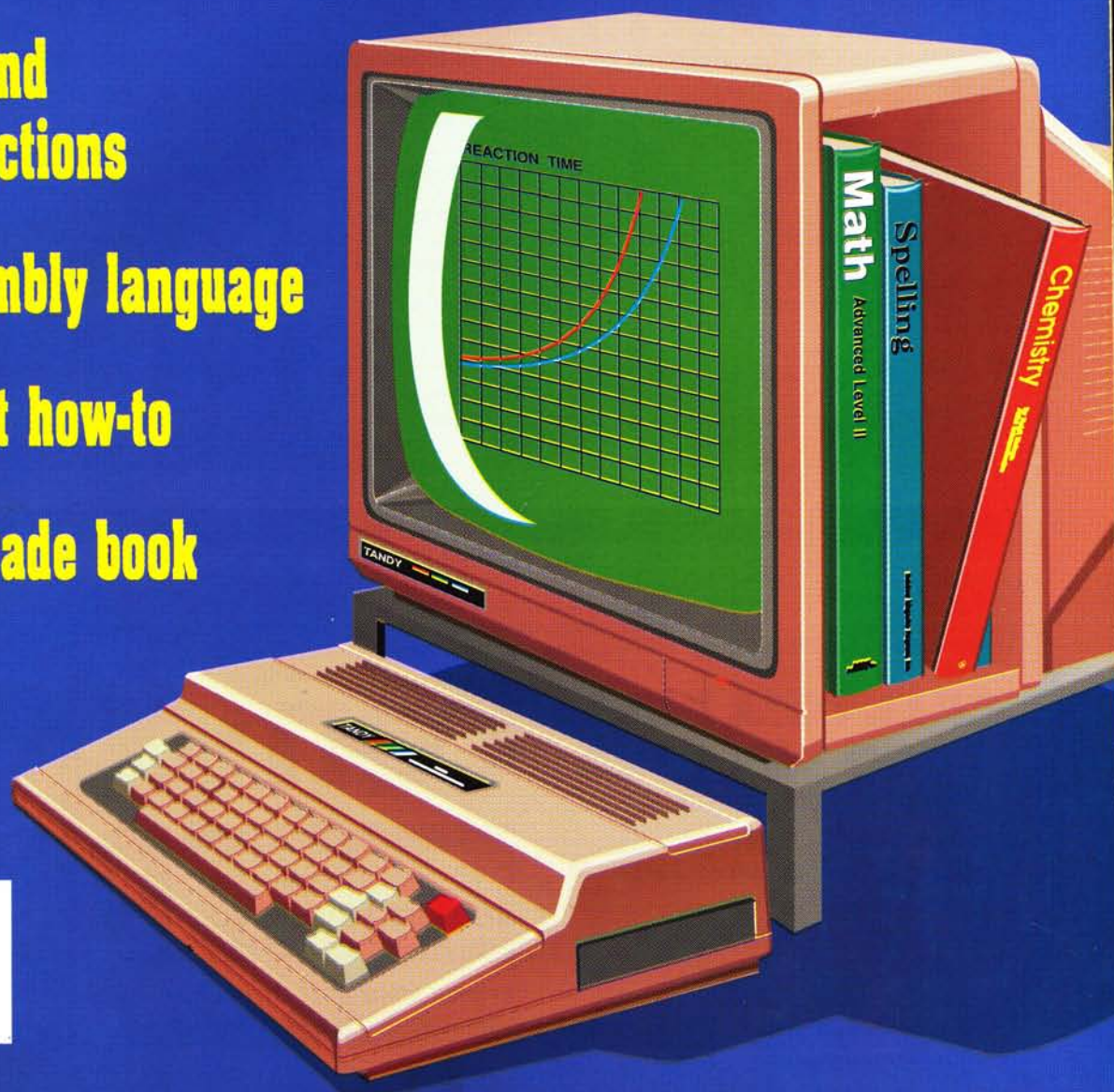
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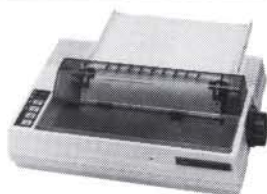
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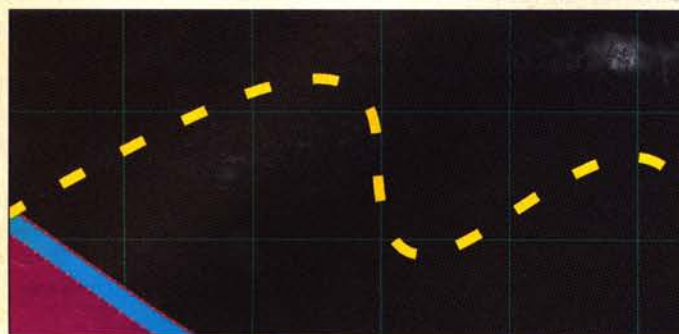
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Letters to the RAINBOW

Video and the CoCo

Editor:

In the July 1990 issue of THE RAINBOW, John Handis made a reference to a video-titling/graphics controller for the CoCo. When I read this, the light came on. *Radio Electronics* ran a series of articles on how to build a video-titler. With the help of those articles, I can build a titling interface.

The device featured was a stand-alone unit that could receive data from any computer, i.e. graphics or different characters. I hope to build a program pack, to be released sometime soon.

The CoCo is already equipped to control an "edit" VCR — if it has a remote/camera pause feature. To use this, wire the cassette relay as a switch on the remote pause.

*Ricky Beam
Shelby, North Carolina*

What a Pro!

Editor:

I had been trying to buy a hard drive system for my CoCo 3. After getting a hard drive, I found that three of your major advertisers would not assist me in deciding what software I needed to partition the hard drive. Most of them wanted me to buy a different interface (one that they sell). To tell you the truth, I was ready to buy an IBM. I finally called Dave Meyers at CoCo Pro!, and he helped me a great deal. Thanks, Dave, for all your help.

*David Jones
Eldora, Iowa*

Solitaire Lovers Are Not Alone

Editor:

This is a song in praise of THE RAINBOW, some contributors and a couple of software companies — sound familiar?

Before ever there was UNIVAC, I was a tireless and dedicated Solitaire card game fan, as were my father and grandfather. When I first got my CoCo, I played all kinds of computer games but still had a hankering for Solitaire.

THE RAINBOW came to my rescue in December 1986, with Tudor P. Jones' excellent *Klondike* game and its upgrades by George Quellhorst and Vincent Johnson (January and December '88).

There is yet more. No Solitaire addict plays just one kind of Solitaire. There are hundreds of them out there. At the '89 New Jersey RAINBOWfest, I got to talking with

the Eversoft people about the need for more Solitaire games, and lo and behold an Eversoft ad appeared in THE RAINBOW for *Classic Solitaire*. I promptly bought it; they promptly sent it. It looks classy and plays great — all three games: *Klondike*, *Canfield* and *Pyramid*.

There must be more Solitaire addicts and games out there. Support Solitaire programmers and keep the games coming. Let mine not be a solo stand.

*Nancy Ewart
Toms River, New Jersey*

Eyes Open for Voice Synthesizer

Editor:

I hope you can help me with my problem! I am very much interested in finding and purchasing a voice synthesizer (a good one, with understandable speech) and a speech recognition unit for my CoCo 3. If there is anyone who can help me, please write.

*Michael Holtry
695 Park Avenue, #216
Idaho Falls, ID 83402*

Pure Mathematics

Editor:

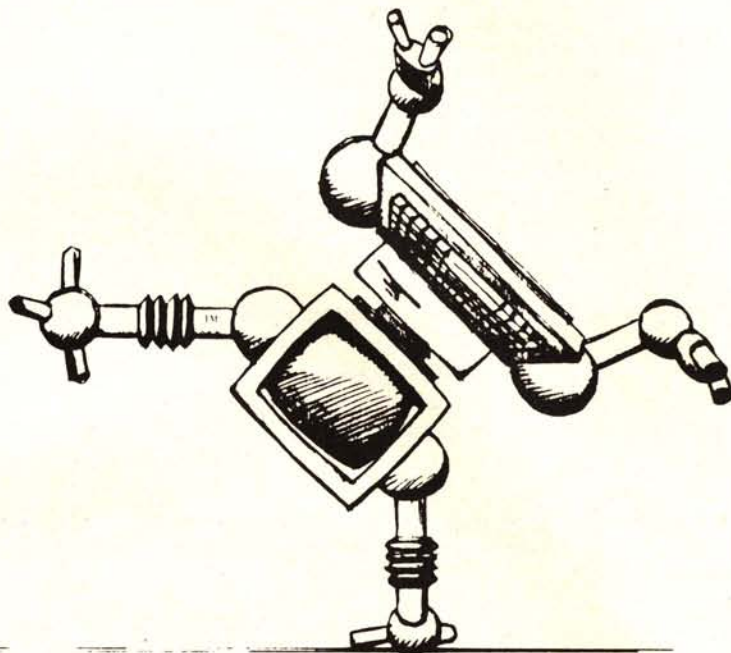
Even though BASIC cannot extract the square root of negative numbers, it is a shame to exclude the roots of quadratic equations with imaginary parts as William Flinn does in the June issue (Page 49). Though engineers and architects may not implement them, imaginary and mixed numbers are important to pure mathematics. One simple change to the listing of QUADRATIC and nine added lines do the trick.

First, change 190 to 210 in Line 81. Next add the following lines:

```
210 S=SQR(-L)
220 T=2*A
230 U=S/T
240 V=-B/T
250 PRINT
260 PRINT" 1ST SOLUTION: ";V+"U"
270 PRINT" 2ND SOLUTION: ";V-"U"
280 PRINT
290 GOTO 190
```

Note that Line 210 tricks BASIC into taking the square root of a negative number, as Line 90 gives the square root of a real number. The former cannot be combined

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COLORWARE

with -B, a real number, as in lines 100 and 130. They occur, divided by 2A, in the roots with the addition and subtraction indicated. "I" is not the proper mathematical *i* but will have to do. Also, I deliberately ignore the mathematician's demand for exact solutions rather than decimal approximations.

Line 200 may leave the program either in limbo or producing rubbish if a key other than Y or N is struck accidentally. I would prefer these two lines:

```
200 IF A$="Y" THEN 10
205 IF A$="N" THEN END ELSE GOTO
190
```

This is protection in any event and essential with the added lines.

David F. Siemens, Jr., Ph.D.
Professor of Philosophy Emeritus
Los Angeles Pierce College

Clickity-Clack

Editor:

What would I do without THE RAINBOW? It's my teacher, guide, gospel, etc. I have all the back issues; what a mine of information!

Some time ago a reader asked you how to put a typewriter click in the keys of his CoCo. I have another problem. My CoCo 3 keys make a loud click, clack noise, which bothers members of my family. How can I silence my CoCo 3?

Lyone Boulton
330 Metcalfe, Apt. 403
Ottawa, ON K2P 1S4
Canada

The Color Computer is not designed to provide audible feedback for the keyboard. The solution is to use software to allow the user to hear when a key is struck. There is no software solution for keys that clack by themselves, and we know of no simple mechanical solution. Maybe one of our other readers can help.

Wanted, Dead or Alive

Editor:

Since I've been subscribing to THE RAINBOW I've come across many useful and informative articles throughout the magazine. This includes vendors that support the CoCo both in Canada and the States. But the main problem is finding which companies still support the CoCo. It appears many companies have disappeared.

I'm looking for the following hardware and software packages:

1) A Super Voice Cartridge — I know Speech Systems no longer supports the CoCo, but is there a replacement for this package?

2) RASCAN Video Digitizer — Does MicroCom Software still sell these units, or have they been dropped?

3) Color Max 3 Deluxe — Is there anyone who still sells this package, or do I need to upgrade to CoCo Max III? I still have a copy of Color Max III 128K version and would like to upgrade it if possible.

4) SolidDrive — Has Vidicom Corporation stopped supporting the CoCo, or is there a supplier that carries this physical RAM disk?

If you could help me track down these products or know of someone who can help me do so, I'd be grateful.

Doug Fraser
Box 137
Burns Lake, BC V0J 1E0
Canada

Get Back to BASIC

Editor:

The CoCo is as good a computer in its class as can be bought, without a doubt. To those of us with no interest in OS-9 or machine language gibberish, THE RAINBOW is a waste of money and time.

I can remember when I looked forward to each month's issue, because I knew there would be some good useable material to copy and save. Now I go to the book store, thumb through the latest issue and leave empty-handed.

Those interested in OS-9 can let Nine-Times Magazine handle it and then THE RAINBOW can get back to the interesting magazine it once was.

THE RAINBOW used to contain from 160 to 180 pages. Since August '89 there has been barely enough material to fill 100 pages.

I can understand the cost to produce a magazine. If it takes a price increase to have the same quality RAINBOW that once was, so be it. I'm sure my feelings are shared by many more CoCo users.

Jim Price
Florence, Alabama

Actually, we see the inclusion of OS-9 as a part of our goal to keep an eye on areas of potential growth for the CoCo Community as a whole. This is called support but, then, we could all learn something about that, eh?

Kudos from Illinois to Dayton

Editor:

I was very pleased with the service and products of Dayton Associates, of W.R. Hall, Inc. I ordered the Star NX-1000 printer system from it on June 1. To my great surprise, I received the system on June 7.

Not only was I pleased with this quick

shipment but with the product itself and the software support included with the system. The support informed me of what my new toy was capable of and aided me in setting up the printer.

Once again, thanks to Dayton Associates and THE RAINBOW.

Tim Keber
Wood River, Illinois

High-Speed Poker

Editor:

I don't recall reading anything about the high-speed poke creating problems with the CoCo 3. On several occasions, while I operated in the high-speed mode (POKE 65497,0) and forgot to return to normal speed, serious problems developed with the disk system.

On one occasion I had a long address file program in the computer, and I saved it to a disk file. Upon using the program the next time, I found the list completely jumbled with some parts missing.

On a couple of other occasions with game programs, I found the disk no longer useable and showing an I/O error, although the directory came up. Attempting to reformat was useless, and I had to throw away the disk.

I have no problem with POKE 65495,0.

Paul A. Scholz
Cotati, California

It has been a while since we published the contraindications of using the high-speed pokes. As you have found, POKE 65497,0 makes disk and tape I/O unreliable, and it doubles the printer output rate. If you are in the habit of using this high-speed poke, make sure you slow the system down using POKE 65496,0, manually or in a program, before trying to save/load files. POKE 65495,0 has no effect on the CoCo 3.

UltiMusE Printer Options

Editor:

I occasionally play accordion with a Scottish band and use UltiMusE with a digital keyboard as a tireless, uncomplaining practice partner. I'm able to do troublesome passages over and over until I get them right. The CoCo and UltiMusE let me play at the correct pitch and tempo — the ultimate luxury.

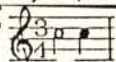
In a previous letter I wrote to your magazine, I agreed with your glowing story about UltiMusE 3, but pointed out that it had a hard-copy problem with the Gemini printer. I had difficulty getting details of this problem through the distributor to Mike Knudsen and asked you to forward my letter with samples of the hard-copy glitch

Continued on Page 87

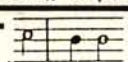
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It All Started With Education



I got a letter from one of our subscribers the other day — Bill Benton in Tuscaloosa, Alabama — and just haven't had time to give him a personal reply. Bill is one of our double family members who has both a CoCo and a Tandy 1000-series computer and says he cannot do without both THE RAINBOW and PCM.

Bill and I, as it turns out, went to the same University — the University of Alabama — and had at least one teacher in common. He mentioned two of his professors in his letter to me, and one of them I had while the other was very well-known among many students.

This being our education issue, I thought it would be a good idea to answer Bill's letter and, at the same time, make some comments about education and teachers.

The oldest theme of THE RAINBOW is education. I suppose that in its first year, as it began to grow, there was enough material around September to actually have some sort of a theme for an issue, and education was it.

I have always thought education to be an integral part of computing and computers. The many things computers can do to help people learn are unending. In some ways we are just touching the surface of these areas. In the CoCo world, Steve Blyn of Computer Island and Fred Scerbo are full-time teachers who have contributed to this mass of information for years.

Let no one ever discount the impact of a teacher. I was talking with my daughter, Wendy, the other day and I asked her who she thought was the most influential teacher of her life. Wendy's considered opinion was her sixth grade teacher, Marsha K. Moore, of Tuscaloosa Academy. As Wendy put it, Ms. Moore shaped her up.

One of the teachers Bill Benton mentions in his letter is Walter Koch of the Department of Geography at Alabama. Dr. Koch is one of the most knowledgeable people I have ever met. He taught U.S. Geography and World Geography, and I do not think he ever referred to a note. He took us through New York City practically street by street, expecting us to know the garment district was in one area and the Avenue of the Americans was really Sixth Avenue.

He was very partial to fill-in-the-blank questions and I will never forget one of them. In United States Geography: "The _____ and _____ rivers meet at _____ and form the _____ River, and this area is called the _____."

That was sort of typical. He expected you to learn it.

Gosh, I wish I had a CoCo back then. I must have made myself 1000 index cards with all this information on it.

By the way, I was extremely interested in this detailed look at the world and decided to tackle Dr. Koch on his area of expertise, geography of the Soviet Union. Oh, my. But he was a heck of a teacher and was always kind enough to spell out those multi-consonant Russian words.

I could go on talking about a list of teachers at the University of Alabama and elsewhere. There are, of course, many excellent ones. My point, however, is that teachers like Dr. Koch and Steve Blyn have greatly influenced our lives, and I am very pleased we can count our Educational Issue as the longest-running theme here at THE RAINBOW.

I really think that is appropriate.

—Lonnie Falk

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Built-in 4 function calculator!



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Align your text in 2 columns with a few keystrokes!



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Freeze a portion of text and edit another. Its fantastic!



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Plot a Lot

by Matthew Hunt

Make abstract math formulas concrete

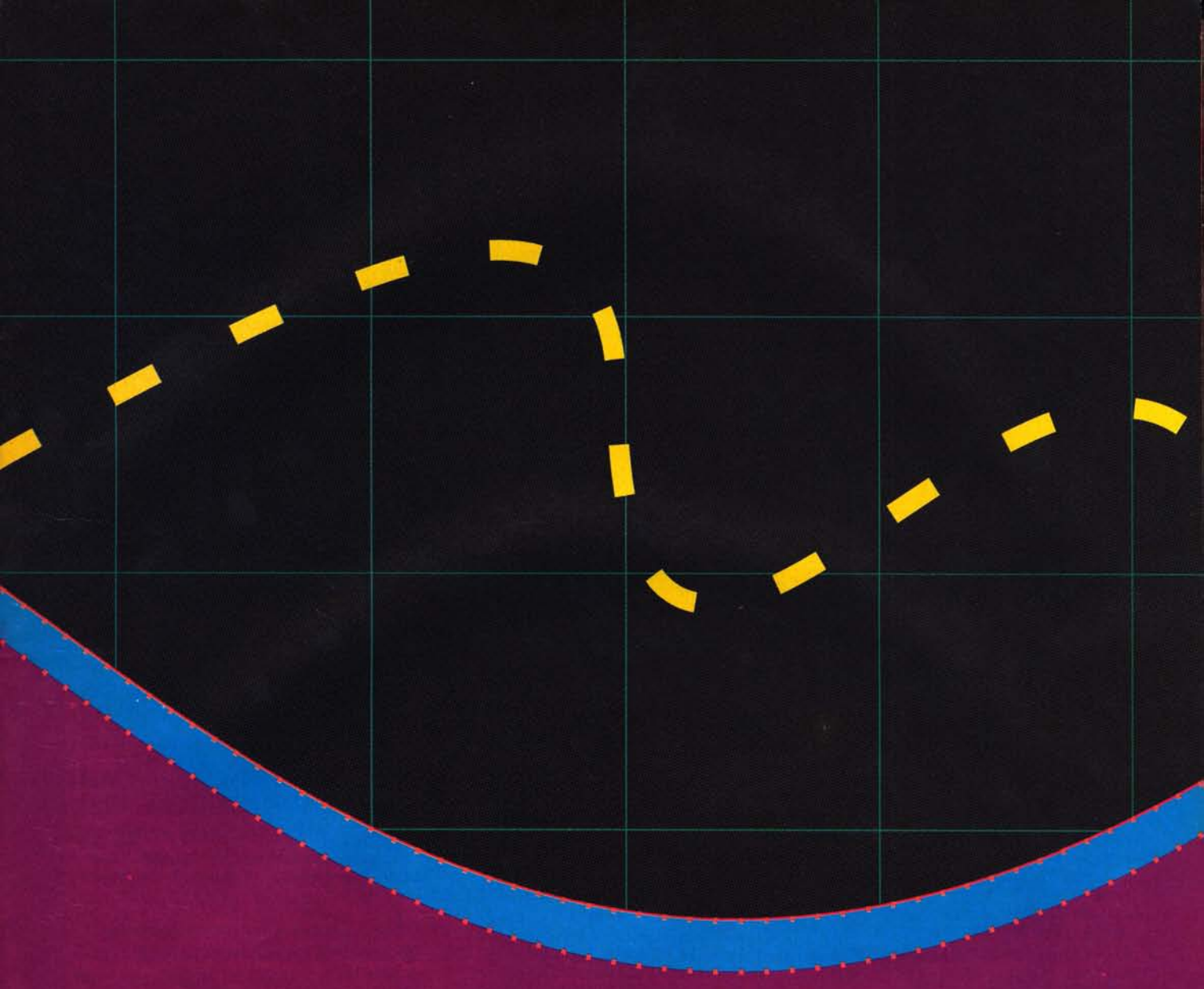
UltraGraph, for the CoCo 3, graphs almost any mathematical equation rapidly — especially considering it uses BASIC in the HSCREEN4 640-by-192 mode. The graphs are in full color and give you information such as x and y intercepts. The program graphs over almost any range, drawing the axis where $x=0$ and $y=0$ based upon the range. It has a title screen and a demo with four graphs that run if no key is pressed in 30 seconds. It also has a built-in screen dump for the Radio Shack DMP-130. UltraGraph graphs lines, parabolas, circles, ellipses, hyperbolas and the trigonometric functions such as sine, cosine and tangent.

Matthew Hunt is 17 years old and attends First Baptist Church School. He has been using Color Computers since 1981. He may be contacted at 84 Smith St., Charleston, SC 29401.

In addition, there is a user-definable function that graphs whatever is typed in, be it $300 \cdot x^2$ or $RND(x)$. A description of each function is given after the option is selected. The program is useful, educational and above all, fun.

After the title screen appears, a menu with 10 choices is displayed. On the bottom of the screen is a timer that counts down from 30 seconds. If this timer reaches zero before you press a key, the program goes into the Demonstration mode. The BREAK key exits at any time and returns you to the beginning of the program, regardless of where you are. Keys 1 through 7 select the function listed beside the number.

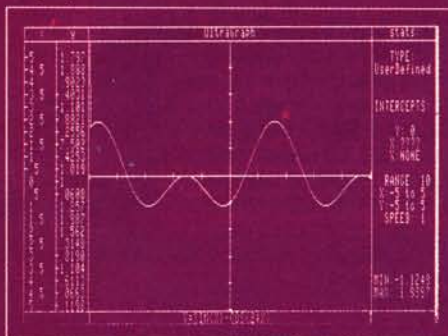
For instance, pressing 1 selects a Line. A description of a line and its mathematical formula are shown, and you are asked for the slope and y -intercept or other information, depending on the graph you have chosen. Press 9 to exit the program.



Pressing 8 allows you to define the user-defined function, which works a little differently. You must have a disk with at least one free granule in the default drive (usually Drive 0). Type in the equation you want to graph, such as $1/x$. Use asterisk (*) to multiply, slash (/) to divide, COS for the cosine function, SIN for the sine function, TAN for the tangent functions, and the up-arrow to raise a value to the specified number. Be careful: The program does not scan for Syntax errors but takes care of functions undefined at a point. When the function is entered, *UltraGraph* writes a line of code to the disk and merges with it. Run the program again and select A to graph the defined function.

Once a function has been entered, you are asked for some other information. First you are asked whether you want to erase the previous screen. If you want to graph the function you have selected over the func-

tion you graphed before it, press N. If you do not or you haven't graphed a function before, press Y. After that, you are prompted for the color you want the graph to be. 1=white, 2=yellow and 3=red. Then enter the range and the minimum x and y values to graph.



For instance, if you want to graph from $x=-2$ to $x=12$ and $y=-4$ to $y=6$, select a range of 10, a minimum x of -2 and a minimum y

of -4. (If you don't know what this means, just press ENTER for the defaults to graph from -5 to 5.) Finally, enter the speed (1 through 4). Each number is twice that of the one before, but only half as many points are plotted. For instance Speed 1 takes about one minute, and about 400 points are plotted. Speed 2 takes about 30 seconds but only plots 200 points, and so on. Faster speeds result in bumpier graphs, making curves somewhat blocky.

Now for the graphing. On the left side of the screen, twenty x and y values are listed. On the right, the type of function, intercepts, range and maximum and minimum values encountered are printed. The function is on the window at the bottom of the screen. After the graph is completed, you are notified via a message in the bottom window. You'll also see the time it took to plot the graph. Press a key and you are asked if you want a screen dump to the

printer. Press N if you do not want a screen dump, and the program loops back to the beginning. If you do want a printout, press Y. The dump takes about 12 minutes; when

it is done, the program starts back at the beginning.

Line 1180 sets the baud to 1200, but the CoCo is in the high-speed mode (Line 50).

The effective rate is 2400 baud and you should set the DIP switches on the DMP-130 for this rate. □

CoCo 3



- MEANS DONE

40	204	620	105	1210	53
70	100	645	38	1270	6
91	128	690	191	20010	171
120	214	750	179	20040	78
170	155	800	156	30010	200
230	146	833	56	50000	16
270	192	910	182	50030	186
295	1	990	201	60001	231
330	144	1020	173	60220	128
400	114	1110	200	60300	201
460	144	1167	207	END	194
550	27				

The Listing: GRAPH

```

(0)'COPYRIGHT 1990 FALSOFT, INC.
(5)ON BRK GOTO 5
(6)ON ERR GOTO 5'IF ERROR, THEN RUN INSTEAD OF CRASHING
(10)'VERSION 3.7-4/23/89
(15)'UltraGraph!
(16)'(c) 1988 by Matthew Hunt
(19)IF TA=0 THEN HBUFF 1,1800:HBUFF 2,1800:HBUFF 3,1800:TA=1
(20)GOTO 40
(30)GOTO 5
(40)CLEAR 1000:TA=1:FI=1:WIDTH 80:ON BRK GOTO 30:GOSUB 1260:ATTR 3,0:Q=23:Y$="<<< Press any key to Continue >>>":GOSUB 1230:Q=0:TIMER=0
(41)A$=INKEY$:IF A$="" AND TIMER/60<10 THEN LOCATE 76,23:PRINT STRING$(10-INT(TIMER/60)):GOTO 41
(42)TA=1
(50)POKE65497,0
(60)R=1:D=1:Q=23:Y$=STRING$(78,""):GOSUB 1230:Q=0:Y$="***** Ultra Graph! *****":GOSUB 1230:Y$="-< By Matthew Hunt >-"+CHR$(13):GOSUB 1230:ATTR 3,2
(70)RGB:PALETTE 0,0:PRINT"1. LINE S":PRINT"2. PARABOLAS":PRINT"3. CIRCLES & ELLIPSES":PRINT"4. HYPERBOLAS":PRINT"5. COS(X)":PRINT"6. SIN(X)":PRINT"7. TAN(X)"
(75)LOCATE 39,12:PRINT"8. Define function":LOCATE 39,13:PRINT"9. End program.":LOCATE 39,14:PRINT"A. Execute defined function":LOCATE 0,19
(80)PRINT STRING$(78,"-"):ATTR 3,0:PRINT CHR$(8):ATTR 3,2:LOCATE 79,19
(89)LOCATE 0,23:ATTR 2,4:TIMER=0:TA=1
(90)A$=INKEY$
(91)LOCATE 0,23:ATTR 3,2:PRINT STRING$(78,"-"):ATTR 2,4:LOCATE 0,1,23:PRINT"Hit number of choice or wait "+STR$(30-INT(TI))" seconds":TI=TIMER/60:IF TI>30 THEN GOTO 30000 ELSE Q1=Q1+F:IF Q1>3
5 THEN F=-1 ELSE IF Q1<1 THEN F=1
(92)IF A$="" THEN 90
(93)IF A$="A" THEN JL=6:TYPE$="User Defined":GOSUB 50070:IF Y$="UNDEFINED" THEN PRINT"Must Define Function FIRST!!!":FOR X=0 TO 1000:NEXT:GOTO 5 ELSE UD=1:GOTO 290
(94)UD=0
(100)IF VAL(A$)<10R VAL(A$)>9 THEN 90
(110)G=VAL(A$)
(115)IF VAL(A$)=9 THEN CLS:PRINT"OK.":POKE65496,0:END
(116)IF G=8 THEN 50000
(120)IF G=1 THEN TYPE$="LINE" ELSE IF G=2 THEN TYPE$="PARABOLA" ELSE IF G=3 THEN TYPE$="CIRCLE" ELSE IF G=4 THEN TYPE$="HYPERBOLA" ELSE IF G=5 THEN TYPE$="COSINE" ELSE IF G=6 THEN TYPE$="SINE" ELSE IF G=7 THEN TYPE$="TANGENT"
(130)JL=G:IF JL>4 THEN JL=JL-2
(140)S=0:IF G>2 AND G<5 THEN S=1:IF G=4 THEN B=-1 ELSE B=1
(150)IF S=1 THEN 970
(155)IF G>4 THEN GOSUB 20000
(160)IF JL=1 THEN GOSUB 1240:Q=12:Y$="<<<< Lines >>>>":GOSUB 1230:Q=Q+1:LOCATE 0,Q:PRINT"An equation for a LINE is in the form [Y=MX+B], where M is the SLOPE (how steep it is), and B is the Y-INTERCEPT, or where the line crosses the Y(VERTICAL)AXIS."
(170)IF JL=1 THEN GOSUB 1220:GOSUB 1240:Q=12:Y$="<<< LINE EQUATION INPUT >>>":GOSUB 1230:Y$="Y=M*X+B":GOSUB 1230:Y$="SLOPE(M)":GOSUB 1230:INPUT M:Y$="Y="+STR$(M)+"*X+B":Q=13:GOSUB 1230:Y$="Y-INTERCEPT(B)":GOSUB 1230:INPUT B:FM$="Y="+STR$(M)+"*X"+STR$(B)
(180)IF JL=1 THEN Q=13:Y$=FM$:GOSUB 1230
(190)IF JL=1 THEN SE=M:HI=B:GOTO 290
(210)IF JL>2 THEN 290
(220)GOSUB 1240:Y$="<Parabolas an
d power functions>"+CHR$(13):GOSUB 1230:PRINT"Parabolas are in the form AX^2+BX+C(^=to the power of). C is the Y-intercept, or where the parabola intersects the y-axis. The program automatically gives the intercepts."
(230)GOSUB 1220:GOSUB 1240:Q=12:Y$="<Parabolas and power functions>":GOSUB 1230:FM$="Y=A*X^?+B*X+C":Y$=FM$:GOSUB 1230
(240)Y$="Power to raise X to(??)[MAX=10,MIN=-10]":GOSUB 1230:INPUT PO:IF PO>10 OR PO<-10 THEN Q=Q-1:GOTO 240:FM$="Y=A*"+STR$(PO)+"*X+C":Y$=FM$:Q=13:GOSUB 1230
(250)Y$="Number to multiply X?? BY(A)[1000 MAX, -1000 MIN]":GOSUB 1230:INPUT NU:IF NU>1000 OR NU<-1000 THEN Q=Q-1:GOTO 250
(260)Y$="Number to multiply the 2nd X by(B)":GOSUB 1230:INPUT SE:IF SE>10000 OR SE<-10000 THEN Q=Q-1:GOTO 260
(270)Y$="Number to add on the end (c)":GOSUB 1230:INPUT HI:IF HI>10000 OR HI<-10000 THEN Q=Q-1:GOTO 270
(280)FM$="Y="+STR$(NU)+"*X"+STR$(PO)+"*"+STR$(SE)+"*X"+STR$(HI):Q=13
(290)GOSUB 1240:Q=15:Y$="Erase previous screen?(y/n)":GOSUB 1230
(291)A$=INKEY$:IF A$="y" OR A$="Y" THEN CL=1:POKE 8HE6E4,8HE7 ELSE IF A$="n" OR A$="N" THEN CL=0:POKE 8HE6E4,8HE6 ELSE GOTO 291
(292)Y$="Color of graph(1-3)?":GOSUB 1230
(293)A$=INKEY$:IF A$="" THEN 293 ELSE IF VAL(A$)<1 AND VAL(A$)>4 THEN GOTO 293 ELSE CO=VAL(A$)
(295)GOSUB 1240:Q=12:Y$="Range of numbers[MAX=200-]":GOSUB 1230:INPUT RA$:IF RA$="" THEN RA=5 ELSE IF VAL(RA$)=0 OR VAL(RA$)<0 OR VAL(RA$)>200 THEN Q=Q-1:GOTO 290 ELSE RA=VAL(RA$)/2
(300)IFS=1 THEN LY=RA:LY=RA:GOTO 350
(310)Y$="LOWEST X-VALUE TO GRAPH?":GOSUB 1230:INPUT LX$:IF VAL(LX$)>10000 OR VAL(LX$)<-10000 THEN Q=Q-1:PRINT"OUT OF RANGE. REDO.":GOTO 310 ELSE IF LX$="" THEN LX=RA ELSE LX=VAL(LX$)
(320)IF LX$="" THEN LX=RA ELSE LX=VAL(LX$)
(330)Y$="LOWEST Y-VALUE":GOSUB 1230:INPUT LY$:IF VAL(LY$)>10000 OR VAL(LY$)<-10000 THEN PRINT"OUT OF RANGE. REDO":Q=Q-1:GOTO 330 ELSE IF LY$="" THEN LY=RA ELSE LY=VAL(LY$)
(340)IF LY$="" THEN LY=RA ELSE LY=VAL(LY$)
(350)MX=LX+RA*2:MY=LY+RA*2

```


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(360) IF JL=1 THEN SP=8:GOTO 390
(370) PRINT"SPEED(1-4)-each # doub
les speed of previous# but halve
s resolution.(1-slowest)"
380 A$=INKEY$:IFA$=""THEN380ELSE
IFVAL(A$)=0THEN380ELSEIFVAL(A$)>
4THEN380ELSESP=2^(VAL(A$)-1)
(385)
(386)
(390) D=1/(436/SP/(RA*2))
(395) IF UD=1 THEN GOSUB 50070:FM$
="Y="+Y$
(400) HSCREEN4:HCOLOR 1:HLIN(102,
184)-(538,191),PSET,BF:PALETTE
1,63:PALETTE 2,54:HLIN(102,191
)-(538,183),PSET,B:HGET(103,190)
-(537,184),3:C$="Graphing:"+FM$:
GOSUB 9999:TIMER=0
(401) IF PEEK(&HE6E4)=&HE6 THEN HL
INE(1,9)-(99,183),PSET,BF:HLIN
E(541,9)-(638,183),PSET,BF
(402) IF S=1 THEN 510
(410) R=6:X$="INTERCEPTS:":GOSUB12
00
(420) IF TYPE$<>"HYPERBOLA"OR TYPE$<
>"CIRCLE"THENR=8:X=0:ON JL GOSUB
1090,1070,1110,1130,1150:X$="Y:
"+STR$(Y):GOSUB1200
(450) IF JL>2 THEN IN$="X:":X$="X:?"
???":GOSUB1200
(460) IF JL>2 AND PO=2 THENGOTO510E
LSEX$="X:":G=SE^2-4*NU*HI:IFG<00
RNU=0THENX$=X$+"NONE":GOSUB1200E
LSEIFG=0THENF=SE/(2*NU):X$=X$+ST
R$(F):GOSUB1200ELSEF=(-SE+G^.5)/(
(2*NU):B=(-SE-G^.5)/(2*NU):X$=X$
+LEFT$(STR$(F),4)+", "+LEFT$(STR$
(B),4):GOSUB1200
(470) MK=R+2:R=1
(480) PALETTE 1,63
(490)
(500) ' DRAW SCREEN
(510) T1=(-LX)*436/(RA*2)+102:T2=(
2*RA+LY)*174/(RA*2)+9:IF T1>102
AND T1<538 THEN HLINE(T1,9)-(T1,
183),PSET
(520) IF T2>9 AND T2<183 THEN HLIN
E(102,T2)-(538,T2),PSET
(530) HLINE(0,0)-(639,191),PSET,B:
HPRINT(35,0),"UltraGraph":HLIN(
0,9)-(639,9),PSET:HLIN(0,183)-(
639,183),PSET
(540) 'PRINT X AND Y VALUES
(550) HLINE(100,0)-(100,191),PSET:
HLIN(540,0)-(540,191),PSET
(560) HCOLOR 2:HPRINT(3,0),"x":HPR
INT(9,0),"y":HPRINT(71,0),"stats
":HCOLOR 1:HLIN(50,9)-(50,183)
,PSET:HCOLOR 2
(570) IF TYPE$="ELLIPSE" OR TYPE$=
"HYPERBOLA"OR TYPE$="CIRCLE" TH
EN GOTO 637 ELSE AM=RA
(580) IF RA<11 THEN ST=RA/10 ELSE
ST=(RA*2)/20
(590) SN=599:X=LX:ON JL GOSUB 1090
,1070,1110,1130,1150,1165:MAX=Y:
MIN=Y
(599) SN=610:N=2:TE=LX
(600) FOR X=TE TO MX STEP ST:ON JL
GOSUB 1090,1070,1110,1130,1150,
1165:IF Y>MAX THENMAX=Y
(610) IF Y<MIN THEN MIN=Y
(620) A$=LEFT$(STR$(Y),6):HPRINT(0
,N),LEFT$(STR$(X),6):IFND=1THENA
$=" DNE"
(630) HPRINT(6,N),A$:N=N+1:IF ERNO
>-1 THEN IF TE=MX THEN TE=X+ST:G
OTO 600 ELSE ELSE NEXT X
(637) X$="TYPE:":R=2:GOSUB 1200:X$
=TYPE$:GOSUB 1200
(638) IF S<>1 AND DE<>1 THEN R=R+8
ELSE IF DE=1 THEN R=R+7
(639) HCOLOR 1:IF SP=4 THEN SP=3 E
LSE IF SP=8 THEN SP=4
640 HC=3:X$=" RANGE:"+STR$(RA*2)
:GOSUB1200:X$="X: "+STR$(LX)+ " to
"+STR$(MX):GOSUB 1200:X$="Y: "+ST
R$(LY)+ " to"+STR$(MY):GOSUB 1200
:X$="SPEED:"+STR$(SP):GOSUB 1200
645 IF DE=1 THEN HCOLOR 2:R=R+1:
X$="Demo mode:":GOSUB 1200:X$="T
o exit hit":GOSUB 1200:X$="<Brea
k>":HCOLOR 1:GOSUB 1200
650 G=436/RA/2:FOR X=320TO102STE
P-G:IF T2>9 AND T2<183 THEN HLIN
E(X,T2-2)-(X,T2+2),PSET:NEXT X:F
OR X=320TO539STEPG:HLIN(X,T2-2)
-(X,T2+2),PSET:NEXTX
660 G=174/RA/2:FOR Y=96TO9STEP-G:
IF T1>102 AND T1<538 THEN HLINE(
T1-2,Y)-(T1+2,Y),PSET:NEXTY:FOR Y
=96TO183STEPG:HLIN(T1-2,Y)-(T1+
2,Y),PSET:NEXTY
(670) K=174/(RA*2):J=436/(RA*2)
(680) M1=103-(RA+LX)*J:M2=(RA+LY)*
K+9
(685) HGET(102,182)-(538,190),2:HG
ET(102,1)-(538,8),1
(690) IF S=1 THEN GOTO 850
(700) 'START GRAPHING
710 SN=715:MK=19:R=19:X=-RA:ON J
L GOSUB 1090,1070,1110,1130,1150
:H=(X+RA)*J+102:R=R+1:MK=R:X$="M
IN:"+STR$(MIN):GOSUB1200:X$="MAX
:"+STR$(MAX):GOSUB1200:I=(-Y+RA)
*K+9:IFI<9THENI=9ELSEIFI>183THEN
I=183:SET UP FOR INITIAL POINT
(715) HCOLOR CO:SN=740:TE=LX
(720) FOR X=TE TO MX STEP D
(730) ON JL GOSUB 1090,1070,1110,1
130,1150,1165
740 IFND=1THENIF ERNO>0 THEN H=(
X+RA)*J+M1:TE=X+D:GOTO 720 ELSE
NEXT X
750 IF Y=0 THEN IF JL>2 THEN IN$
=IN$+LEFT$(STR$(X),3):X$=IN$:R=M
K-3:GOSUB1200
760 IF Y>MAX THEN MAX=Y:X$="MAX:
"+STR$(Y):R=MK+1:GOSUB1200:HCOLOR
R CO
770 IF MIN>Y THEN X$="MIN:"+STR$
(Y):R=MK-MIN-Y:GOSUB1200:HCOLOR
CO
780 T=(X+RA)*J+M1:Y=(-Y+RA)*K+M2
790 IFY<9 THEN IF I=183 THEN I=9
:Y=9:NEXT X ELSE Y=0:HLIN(H,I)-
(T,Y),PSET:HPUT(102,1)-(538,8),1
,PSET:I=9:Y=9:H=T:NEXT X
800 IFY>183 THEN IF I=9 THEN I=1
83:Y=183:H=T:NEXT X ELSE Y=191:H
LINE(H,I)-(T,Y),PSET:HPUT(102,18
2)-(538,190),2,PSET:I=183:Y=183:
H=T:NEXT X
(810) HLINE(H,I)-(T,Y),PSET:H=T:I=
Y
(820) IF X<MX THEN NEXT X
829 IF DE=1 THEN ON LN GOSUB 300
10,300020,30030,40000:GOSUB 40500
:GOTO 390 ELSE C$="Graph comple
ted("+MID$(STR$(TIMER/60),2,4)+"
secs)-hit any key":GOSUB 9999
(830) A$=INKEY$:IFA$=""THEN830
831 C$="Print Screen to printer(
Y/N)?:GOSUB 9999
832 IF A$="N" OR A$="n" THEN GOT
O 5 ELSE IF A$="y" OR A$="Y" THE
N GOTO 833 ELSE A$=INKEY$:GOTO 8
32
833 C$=FM$:GOSUB 9999:GOTO 1180
840 'GRAPH HYPERBOLAS, ELLIPSES, A
ND CIRCLES
850 FORX=LX TO MX STEP D
(860) F=C*D2*(EQ-B*(X^2/D1)):IFF<0
THENH=96:E=96:G=(X+RA)*J+M1:NEXT
X
870 IF F>0THENY=F^.5 ELSE IF X<R
A-D THEN NEXT X
(880) IF F<9THENF=9ELSEIFF>183THEN
F=183
890 T=(X+RA)*J+M1:F=(Y+RA)*K+9:Y
=(-Y+RA)*K+M2
900 IFF<9THENF=0ELSEIFF>183THENF
=192
910 IFY<9THENG=T:E=9:H=F:V=1ELSE
IFY>183THENG=T:E=183:H=F:V=1ELSE
V=0
(920) IFV=1THEN950
(930) IF X>RA THEN GOTO830
(940) HLINE(G,E)-(T,Y),PSET:HLIN(
G,H)-(T,F),PSET:G=T:E=Y:H=F
(950) IF X<RA-D THEN NEXT X
(960) GOTO 829
(970) IF B=-1 THEN L$="-" ELSE L$=
"+"
(980) GOSUB 1240:Y$=" CIRCLES/HYPE
RBOLAS/ELLIPSES"+CHR$(13):Q=12:G
OSUB 1230
990 PRINT"Hyperbolas, circles, a
nd ellipses are all quite simila
r. Everyone knows what a circ
le is. An ellipse is just a sor
t of stretched-out circle, and a
hyperbola looks like an ellipse
cut in two and flipped."
1000 Q=17:Y$="Enter in the form
[x/v1]^2+(- for hyperbola)[y/v2]
^2=v3":GOSUB 1230:GOSUB 1220
1010 GOSUB 1240:Y$="<<<Circles,e1
lipses, & hyperbolas>>":Q=12:GOS
UB 1230:Y$="[X/V1]" +L$+"[Y/V2]=V
3":GOSUB 1230:Y$="Value for v1":
GOSUB 1230:INPUT D1
1020 Y$="[X/" +STR$(D1)+"]" +L$+"[
Y/V2]=v3":Q=13:GOSUB 1230:Y$="Va
lue for v2?":GOSUB 1230:INPUT D2
:FM$="[X/" +STR$(D1)+"]" +L$+"[Y/"
+STR$(D2)+"]" =Y$:FM$="v3":Q=13:
GOSUB 1230:Y$="Value for v3?":GO
SUB 1230:INPUT EQ:FM$="[X/" +STR$
(D1)+"]" +L$+"[Y/" +STR$(D2)+"]" =
1030 FM$=FM$+STR$(EQ):IF EQ=0 OR
D1=0 OR D2=0 THEN Y$="Sorry, I
am unable to divide by zero! Pl
ease enter again.":GOSUB 1230:GO
SUB 1220:GOTO 970
(1040) C=1
(1050) IF G=4 THEN IF D1>D2 THEN B
=-1:C=-1
(1060) GOTO 290
(1070) IFPO>-1ANDPO<1ANDX<0THENH=3
19:I=96:ND=1:RETURNELSEY=NU*X*PO
+SE*X+HI:ND=0
(1080) RETURN
(1090) Y=M*X+B
(1100) RETURN

```


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by Dale Harris

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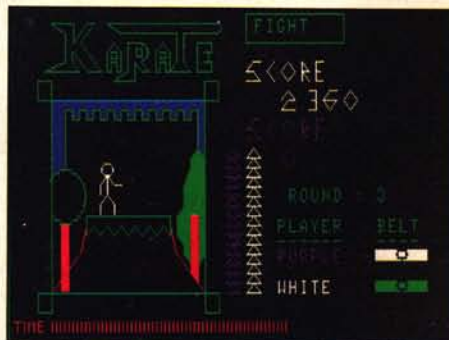
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Attack

Low Kick: While holding the button down, pull the joystick back.

Mid kick: Center the joystick and press the button.

High kick: With the button pressed, push the joystick forward.



Jump kick: Move the joystick forward, then center it and press the button. (If your opponent lands a punch while you are attempting a jump kick, you lose the round.)

Punch: Push the joystick lever away from your opponent and press the button.

Dale Harris is a self-taught programmer. He is 16 years old and has owned a CoCo 3 for four years. He enjoys writing games for his computer. He can be contacted at 45-47 45 Ave., Gibbons, Alberta T0H 1N0 Canada.

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Defense

Walk left: Hold the joystick to the left.

Walk right: Hold the joystick to the right.

Duck: Hold the joystick back (this will avoid a blow to the head).

Leg lift: Hold the joystick forward (this will avoid a blow to the knee).

Each blow to your opponent decreases his strength. The first player to run out of energy loses that round, and the winner moves up one belt level. The belt levels are: white, yellow, green, purple, blue, brown

and black. The first player to attain a black belt wins the game.

Screen Description

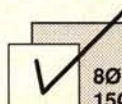
The fight ring is located in the upper-left quarter of the screen. Below it is the time bar. When the bar reaches zero the round ends and the stronger player wins. To the right of the ring is the score panel. Points are awarded for each blow landed and for time and strength remaining at the end of a round. The more difficult the maneuver, the more points awarded for it. Below the score, each player's belt level is displayed. The energy level for each player is shown

between the fight ring and the score (keep an eye on this, as you may want to take drastic measures if you grow too weak).

One person can play against the CoCo 3 or two players can compete against each other. To play the computer, plug a joystick into the right port. When the screen is displayed, press the button to fight. For two players, plug in both joysticks. When the screen is displayed, press the left joystick button.

To play *Karate*, a 128K CoCo 3 and one or two joysticks are all you need. Good fighting and Banzai!

CoCo 3



80	59	1060	181	1850	117
150	109	1100	56	1920	2
200	88	1140	166	1990	36
270	180	1170	36	2090	122
320	28	1200	79	2160	138
390	205	1230	251	2230	129
480	232	1260	159	2310	46
560	177	1330	212	2390	70
630	105	1390	118	2450	26
700	118	1450	201	2520	142
770	85	1570	114	END	79
850	243	1690	9		
960	11	1790	108		

```

(280)FORT=30 TO 220 STEP 3:HLIN(
T,165)-(T,170),PSET:NEXTT
(290)PW$="F5L10E5BD5":HDRAW"C6":H
DRAW"BM160,75":FORT=1T015:HDRAWP
W$:NEXTT
(300)HDRAW"C5":HDRAW"BM175,75":FO
RT=1T015:HDRAWPW$:NEXT
(310)HDRAW"C3:BM31,149;E20M55,115
;BM139,149;H20M115,115;BM55,110;
C0;R60D10U10L60D10E5F5E5F5E5F5E5
F5E5F5E5F5"
(320)HDRAW"C3:BM130,140;U30R5D35U
10C0E5U50H5G5D5M125,95;D10G5D10F
5D5F5C3D5U30R5D35U10C0R1U26L7D26
C3BM130,140;U30R5D35":HPAINT(135
,100),0,0:HPAINT(133,130),3,3
(330)HDRAW"BM135,75;C0;U20;L5D5L5
U5L5D5L5U5L5D5L5U5L5D5L5U5L5D5L5
U5L5D5L5U5L5D5L5U5L5D5L5U5L5D5L5
U5L5D30"
(340)HCIRCLE(40,100),15,0,1,.62,.
39:HDRAW"C3":HLIN(37,115)-(42,1
49),PSET,BF
(350)HPAINT(35,75),2,0
(360)HDRAW"C5:BM65,109;U5E5F5D5U5
H5U10F5R5L5H5G5D5U5E5R2E2U2H2L4G
2D2F2R2
(370)HDRAW"C6:BM100,109;U5E5F5D5U5
H5U10F5D5U5H5G5L5R5E5R2E2U2H2L4
G2D2F2R2
(380)HPRINT(22,1),"READY?"
(390)'title screen #2
(400)HDRAW"C3:BM75,87;R2BR3R2BR3R
2BR3R2BR3R2BR3
(410)HDRAW"BM88,87;U3D6U3E3G3F3H6
F3G3"
(420)FORA=1T020
(430)IF BUTTON(0)=1 THEN CM=1:GOT
0580 ELSE IF BUTTON(2)=1 THEN CM
=0:GOT0580
(440)NEXTA
(450)HDRAW"C8:BM88,87;U3D6U3E3G3F
3H6F3G3;C3;E6G3U3D6U3R3L6"
(460)FORA=1T020
(470)IF BUTTON(0)=1THENCM=1:GOT05
80ELSEIFBUTTON(2)=1 THEN CM=0:GO
T0580
(480)NEXTA
(490)HDRAW"C8:BM88,87;E3G6E3U3D6U
3R3L6;BM88,87;C3;R3L6R3E3G6E3F3H
6"
(500)FORA=1T020
(510)IF BUTTON(0)=1THENCM=1:GOT05
80 ELSE IF BUTTON(2)=1THENCM=0:G

```

The Listing: KARATE

```

(0)'COPYRIGHT 1990 FALSOFT, INC.
(10)'*****
* K A R A T E *
* BY *
* DALE M HARRIS *
* (C) 1988 *
*****
(20)CLEAR 800
(30)POKE 65497,0
(40)'title screen #1
(50)PLAY"V31"
(60)RGB:PALETTE14,48::PALETTE12,8
:PALETTE13,0
(70)CLS4:PRINT@205,"KARATE";
(80)PRINT@262,"HARRIS SOFTWARE 87
-88";
(90)FORT=1T030:PLAY"T255:L25501AB
CDEV-":PALETTE12,RND(8):PALETTE5
,63:NEXT:PALETTE6,12
(100)PALETTE12,1:PALETTE13,0:FORT
=1T0300:NEXT
(110)'set up graphics
(120)HSCREEN2:HCLS8:HDRAW"C0;BM30
,10;M40,15;D15;M25,35;R25H5U5RF1
0R10H15E10L5G10U10L15"
(130)HDRAW"BM70,35;U10D10R3U5R4D5
R3U10H5G5BR3R4D3L4U3"
(140)HDRAW"BM75,40;M85,35;U15R10B
D3D4L4U4R4D4B03F5L5H5D10L15":HCI
RCLE(95,25),5,.1,.75,.25
(150)HDRAW"BM105,35;U10D10R3U5R4D
5R3U10H5G5BR3R4D3L4U3"
(160)HDRAW"BM115,35;E5U15L40M70,1

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0R80F2D1G2L25D15F5L15"
(170)HDRAW"BM135,35;U15R10D5L5R3D
5L3R5D5L10"
(180)HDRAW"C0":HLIN(20,40)-(30,5
0),PSET,B:HLIN(140,40)-(150,50)
,PSET,B:HLIN(20,150)-(30,160),P
SET,B:HLIN(140,150)-(150,160),P
SET,B:HLIN(30,50)-(140,150),PSE
T,B
(190)HPRINT(25,12),"ROUND : 1"
(200)HDRAW"C0":HPRINT(24,14),"PLA
YER BELT":HDRAW"C6":HPRINT(24,
16),"PURPLE":HDRAW"C5":HPRINT(24
,18),"WHITE":HDRAW"C0":HPRINT(24
,15),"-----"
(210)HDRAW"C5":HLIN(263,128)-(30
0,133),PSET,BF:HCIRCLE(282,130),
4,8:HLIN(263,144)-(300,149),PSE
T,BF:HCIRCLE(282,146),4,8
(220)HLIN(170,5)-(240,20),PSET,B
(230)HDRAW"C5:BM180,30;L5G5R5F5L1
0BM190,30;G5F5;BM200,30;F5G5H5E5
;BM210,30;F5L5F5BL5U10;BM220,30;
D10R5L5U5R3L3U5R5L5"
(240)HDRAW"BM200,45;F5G5H5E5"
(250)HDRAW"C6:BM180,60;L5G5R5F5L1
0BM190,60;G5F5;BM200,60;F5G5H5E5
;BM210,60;F5L5F5BL5U10;BM220,60;
D10R5L5U5R3L3U5R5L5"
(260)HDRAW"BM200,75;F5G5H5E5"
(270)HDRAW"C3:BM5,165;D5U5R3L6;BM
10,165;D5;BM15,167;E2D5U5G2H2D5;
BM20,165;D5R3L3U3R3L3U2R3L3"

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OT0580
(520) NEXTA
(530) HDRAW"C8;BM88,87;R3L6R3E3G6E
3F3H6;BM88,87;C3R3L6R3U3D6U3H3F6
"
(540) FORA=1T020
(550) IF BUTTON(0)=1 THEN CM=1:GOT
0580 ELSE IF BUTTON(2)=1 THEN CM
=0:GOT0580
(560) NEXTA
(570) HDRAW"C8;BM88,87;R3L6R3U3D6U
3E3F6;C3":GOTO 410
(580) HDRAW"C8":HLINE(75,80)-(101,
90),PSET,BF
(590) HLINE(170,5)-(240,20),PSET,B
F:HDRAW"C0":HLINE(170,5)-(240,20
),PSET,B:HPRINT(22,1),"FIGHT!"
(600)' set up variables
(610) X1=65:X2=100:P1=15:P2=P1:S1=
0:S2=0:TM=220:M1=1:M2=1:PW$="R5H
5G5R5":RD=1:R1=0:R2=0
(620) DIM MN$(2,9),NM$(10),BT$(5)
(630) BT$(0)="WHITE":BT$(1)="YELLOW"
BT$(2)="GREEN":BT$(3)="PURPLE"
BT$(4)="BLUE":BT$(5)="BROWN":B
T(0)=5:BT(1)=1:BT(2)=0:BT(3)=6:B
T(4)=2:BT(5)=14
(640) DATA U5E5F5D5U5H5U10F5R5L5H5
G5D5U5E5R2E2U2H2L4G2D2F2R2,U5E5F
5D5U5H5U10F5D5U5H5G5L5R5E5R2E2U2
H2L4G2D2F2R2
(650) ***** still
(660) DATA U5E15G10U10F5R5L5H5G5D5
U5E5R2E2U2H2L4G2D2F2R2,BR10U5H15
F10U10F5D5U5H5G5L5R5E5R2E2U2H2L4

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```

G2D2F2R2
(670) ***** head kick
(680) DATA U5E5R5F5H5L5U10F5R5L5H5G
5D5U5E5R2E2U2H2L4G2D2F2R2,BR10U5
H5L5G5E5R5U10F5D5U5H5G5L5R5E5R2E
2U2H2L4G2D2F2R2
(690) ***** knee kick
(700) DATA U5E5R10L10U10F5R5L5H5G5
D5U5E5R2E2U2H2L4G2D2F2R2,BR10U5H
5L10R10U10F5D5U5H5G5L5R5E5R2E2U2
H2L4G2D2F2R2
(710) ***** waist kick
(720) DATA U5E5F5D5U5H5U10R10L10G5
R7L7E5R2E2U2H2L4G2D2F2R2,U5E5F5D
5U5H5U10F5L7R7H5L10R10R2E2U2H2L4
G2D2F2R2
(730) ***** punch
(740) DATA U5E5R5D5U5L5U10F5R5L5H5
G5D5U5E5R2E2U2H2L4G2D2F2R2,BR10U
5H5L5D5U5R5U10F5D5U5H5G5L5R5E5R2
E2U2H2L4G2D2F2R2
(750) ***** jump
(760) DATA BL5E5R10F5H5L5U5E5D5R5L
5U5L5G5E5R5R2E2U2H2L4G2D2F2R2,BL
5E5R10F5H5L5U5H5R5F5H5L5D5L5R5U5
R2E2U2H2L4G2D2F2R2
(770) ***** duck
(780) DATA BR5E5H5G5F5E5H5U10F5R5L
5H5G5D5U5E5R2E2U2H2L4G2D2F2R2,BR
5E5H5G5F5E5H5U10F5D5U5H5G5L5R5E5
R2E2U2H2L4G2D2F2R2
(790) ***** walk
(800) DATA BU20L7R12F5L5R5H5U5U5F5
D5U5H5G5L5R5E5R2E2U2H2L4G2D2F2R2
,BU20R5L5G5R5L5E5R12L12U5U5F5R5L

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```

5H5G5D5U5E5R2E2U2H2L4G2D2F2R2
(810) ***** jump kick
(820) FORT=1T08:READMN$(1,T):READ
MN$(2,T):NEXT:READ MN$(2,9),MN$(
1,9)
(830) DATA E5H5G5F5
(840) DATA U10G3
(850) DATA R5L10E5R5H5G5
(860) DATA R5U5L3R3U5L5
(870) DATA U10G5R7
(880) DATA H5F5E5L5H5R10
(890) DATA H5F5E5L10E5R5
(900) DATA U5E5L10
(910) DATA U5L5U5R5D5L5D5R5
(920) DATA U10L5D5E5
(930) FORT=1T010:READ NM$(T):NEXTT
(940) K1$="T255L255V3101ADCFBAGEDV
16ACGADV4EABCAEDB"
(950) PLAY"V15T4L404ADEFA":HDRAW"C
8":HLINE(170,5)-(240,20),PSET,BF
:HDRAW"C0":HLINE(170,5)-(240,20)
,PSET,B:HPRINT(22,1),"FIGHT"
(960) K2$="T4L255;V31;01;1;2;3;4;5
;V16;5;1;4;V4;1;6"
(970)'fight routine
(980) C1=0:C2=0:IF F1<>1 THEN A1=J
OYSTK(0):B1=JOYSTK(1)
(990) IF F2<>1 THEN IF CM=0 THEN A
2=JOYSTK(2):B2=JOYSTK(3)
(1000) IF F1<>1 THEN C1=BUTTON(0)
(1010) IF F2<>1 THEN C2=BUTTON(2)
(1020) IF F1=1 THEN T1=T1+1:IF T1=
2 THEN F1=0:T1=0:
(1030) IF F2=1 THEN T2=T2+1:IF T2=
2 THEN F2=0:T2=0

```

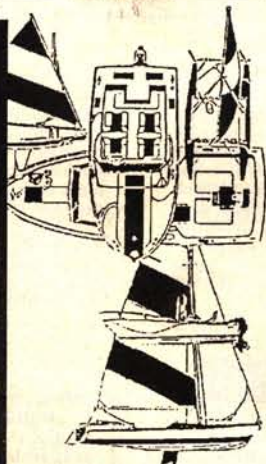
NEW!



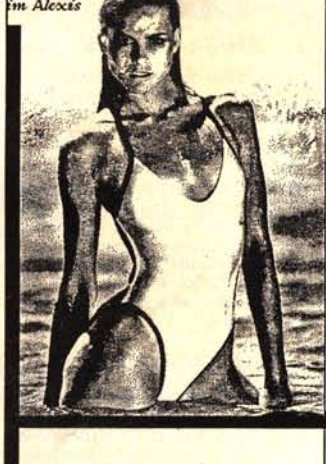
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```

(1040) IF CM=1 THEN GOSUB 2390
(1050) HDRAW"C8":HLINE(TM,165)-(TM
-3,170),PSET,BF:HDRAW"C3":TM=TM-
3
(1060) HDRAW"C5:BM"+STR$(X1)+",109
;XMN$(1,M1);":HDRAW"C6:BM"+STR$(
X2)+",109;XMN$(2,M2);":
(1070) IF TM<30 THEN SOUND100,1:GO
TO2040
(1080) IF D1=1 THEN IF A1<>63 AND
B1<>0 AND A1<>0 AND B1<>0 THEN D
1=1 ELSE D1=0:M1=1:HDRAW"BM"+STR
$(X1)+",109;C8;XMN$(1,7);BM"+STR
$(X1)+",109;C5;XMN$(1,M1);":
(1090) IF D2=1 THEN IF A2<>63 AND
B2<>0 AND A2<>0 THEN D2=1 ELSE D
2=0:M2=1:HDRAW"BM"+STR$(X2)+",10
9;C8;XMN$(2,7);BM"+STR$(X2)+",10
9;C6;XMN$(2,M2);":
(1100) IF J1=1 THEN IF A1<>63 AND
A1<>0 AND B1<>63 THEN J1=1 ELSE
J1=0:M1=1:HDRAW"BM"+STR$(X1)+",1
09;C8;XMN$(1,6);C5BM"+STR$(X1)+",
109;XMN$(1,1);":
(1110) IF J2=1 THEN IF A2<>63 AND
A2<>0 AND B2<>63 THEN J2=1 ELSE
J2=0:M2=1:HDRAW"BM"+STR$(X2)+",1
09;C8;XMN$(2,6);C6;BM"+STR$(X2)+",
109;XMN$(2,1);":
(1120) IF A1<>0 AND A1<>63 AND B1<
>0 AND B1<>63 AND C1<>1 AND C2<>
1 AND A2<>0 AND A2<>63 AND B2<>6
3 AND B2<>0 THEN 980
(1130) IF A1=0 AND X1<>56 THEN GOS

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UB 1320:HDRAW"BM"+STR$(X1)+",109
;XMN$(1,8);":M1=8:GOSUB1320:X1=X
1-1:HDRAW"BM"+STR$(X1)+",109;XMN
$(1,1);":M1=1:J1=0:D1=0
(1140) IF A2=0 AND X2<>X1+12 THEN
GOSUB 1330:HDRAW"BM"+STR$(X2)+",
109;XMN$(2,8);":M2=8:GOSUB1330:X
2=X2-1:HDRAW"BM"+STR$(X2)+",109;
XMN$(2,1);":M2=1:J2=0:D2=0
(1150) IF A2=63 AND X2<>108 THEN GO
SUB 1330:HDRAW"BM"+STR$(X2)+",10
9;XMN$(2,8);":M2=8:GOSUB1330:X2=
X2-1:HDRAW"BM"+STR$(X2)+",109;XM
N$(2,1);":M2=1:J2=0:D2=0
(1160) IF A1=63 AND X1<>X2-12 THEN
GOSUB 1320:HDRAW"BM"+STR$(X1)+",
109;XMN$(1,8);":M1=8:GOSUB1320:X
1=X1+1:HDRAW"BM"+STR$(X1)+",109;
XMN$(1,1);":M1=1:J1=0:D1=0
(1170) IF C1=1 AND J1<>1 AND A1<>0
AND A1<>63 AND B1<>0 AND B1<>63
THEN GOSUB 1320:HDRAW"BM"+STR$(
X1)+",109;XMN$(1,4);":PLAYK2$:M1
=4:GOSUB 2470:GOSUB 1340:M1=4:GO
SUB 1320:HDRAW"BM"+STR$(X1)+",10
9;XMN$(1,1);":M1=1:J1=0:D1=0
(1180) IF C1=1 AND J1=1 AND A<>0 A
ND A1<>63 AND B1<>0 THEN GOSUB 13
20:X1=X1+2:HDRAW"BM"+STR$(X1)+",
109;XMN$(1,9);":M1=9:PLAYK2$:GOS
UB2060:GOSUB 1380:GOSUB 1320:X1=
X1+1:GOSUB 1320:HDRAW"BM"+STR$(X
1)+",109;XMN$(1,1);":M1=1:J1=0
(1190) IF C2=1 AND J2=1 AND A2<>0A

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ND A2<>63 AND B2<>0 THEN GOSUB 13
30:X2=X2-2:HDRAW"BM"+STR$(X2)+",
109;XMN$(2,9);":M2=9:PLAYK2$:GOS
UB2090:GOSUB 1400:GOSUB 1330:X2=
X2-1:GOSUB1330:HDRAW"BM"+STR$(X2
)+",109;XMN$(2,1);":M2=1:C2=0:J2
=0
(1200) IF C2=1 AND J2<>2 AND A2<>0
AND A2<>63 AND B2<>0 AND B2<>63
THEN GOSUB 1330:HDRAW"BM"+STR$(
X2)+",109;XMN$(2,4);":PLAYK2$:M2
=4:GOSUB 2510:GOSUB 1360:M2=4:GO
SUB 1330:HDRAW"BM"+STR$(X2)+",10
9;XMN$(2,1);":M2=1:J2=0:D2=0
(1210) IF C1=1 AND B1=0 THEN GOSUB
1320:HDRAW"BM"+STR$(X1)+",109;XM
N$(1,2);":PLAYK2$:M1=2:GOSUB2310
:GOSUB 1380:M1=2:GOSUB1320:HDRAW
"BM"+STR$(X1)+",109;XMN$(1,1);":
M1=1:J1=0:D1=0
(1220) IF C2=1 AND B2=0 THEN GOSUB
1330:HDRAW"BM"+STR$(X2)+",109;XM
N$(2,2);":PLAYK2$:GOSUB2330:M2=2
:GOSUB 1400:M2=2:GOSUB1330:HDRAW
"BM"+STR$(X2)+",109;XMN$(2,1);":
M2=1:J2=0:D2=0
(1230) IF C1=1 AND A1=0 THEN GOSUB
1320:HDRAW"BM"+STR$(X1)+",109;X
MN$(1,5);":PLAYK2$:K2$:M1=5:GOSU
B1380:M1=5:GOSUB1320:HDRAW"BM"+S
TR$(X1)+",109;XMN$(1,1);":M1=1:J
1=0:D1=0
(1240) IF C2=1 AND A2=63 THEN GOSU
B 1330:HDRAW"BM"+STR$(X2)+",109;

```

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\$59.95

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Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package.

\$59.95

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Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package.

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XMN$(2,5);":PLAYK2$+K2$:M2=5:GOS
UB1400:M2=5:GOSUB1330:HDRAW"BM"+
STR$(X2)+",109;XMN$(2,1);":M2=1:
J2=0:D2=0
(1250) IF C2=1 AND B2=63 THEN GOSU
B1330:HDRAW"BM"+STR$(X2)+",109;X
MN$(2,3);":PLAYK2$:M2=3:GOSUB237
0:GOSUB 1420:M2=3:GOSUB1330:Hdra
W"BM"+STR$(X2)+",109;XMN$(2,1);":
M2=1:J2=0:D2=0
(1260) IF C1=1 AND B1=63 THEN GOSU
B1320:HDRAW"BM"+STR$(X1)+",109;X
MN$(1,3);":PLAYK2$:M1=3:GOSUB235
0:GOSUB1440:M1=3:GOSUB1320:HDRAW
"BM"+STR$(X1)+",109;XMN$(1,1);":
M1=1:J1=0:D1=0
(1270) IF B1=63 AND C1=0 THEN GOSU
B 1320:M1=7:HDRAW"BM"+STR$(X1)+",
109;XMN$(1,M1);":D1=1
(1280) IF B2=63 AND C2=0 THEN GOSU
B 1330:M2=7:HDRAW"BM"+STR$(X2)+",
109;XMN$(2,M2);":D2=1
(1290) IF B2=0 AND C2=0 THEN GOSUB
1330:M2=6:HDRAW"BM"+STR$(X2)+",
109;XMN$(2,M2);":J2=1
(1300) IF B1=0 AND C1=0 THEN GOSUB
1320:M1=6:HDRAW"BM"+STR$(X1)+",
109;XMN$(1,M1);":J1=1
(1310) GOTO 980
(1320) HDRAW"C8;BM"+STR$(X1)+",109
;XMN$(1,M1);C5":RETURN
(1330) HDRAW"C8;BM"+STR$(X2)+",109
;XMN$(2,M2);C6":RETURN
(1340) IF X1>X2-15 THEN S=S1:S1=S1
+50:HDRAW"BM"+STR$(X2)+",109;C3;
XMN$(2,M2);":PLAYK1$:GOSUB 1460:
GOSUB 1590
(1350) RETURN
(1360) IF X2<X1+15 THEN S=S2:S2=S2
+50:HDRAW"BM"+STR$(X1)+",109;C3;
XMN$(1,M1);":PLAYK1$:GOSUB 1620:
GOSUB 1750
(1370) RETURN
(1380) IF X1>X2-15 AND D2<>1 THEN
S=S1:S1=S1+125:HDRAW"BM"+STR$(X2
)+",109;C3;XMN$(2,M2);":PLAYK1$:
GOSUB1460:GOSUB1590:IFM1=9THENGOS
UB1590
(1390) RETURN
(1400) IF X2<X1+15 AND D1<>1 THEN
S=S2:S2=S2+125:HDRAW"C3;BM"+STR$
(X1)+",109;XMN$(1,M1);":PLAYK1$:
GOSUB1620:GOSUB1750:IFM2=9 THEN
GOSUB1750
(1410) RETURN
(1420) IF X2<X1+17 AND J1<>1 THEN
S=S2:S2=S2+100:HDRAW"C3;BM"+STR$
(X1)+",109;XMN$(1,M1);":PLAYK1$:
GOSUB1620:GOTO1750
(1430) RETURN
(1440) IF X1>X2-17 AND J2<>1 THEN
S=S1:S1=S1+50:HDRAW"BM"+STR$(X2)
+",109;C3;XMN$(2,M2);":PLAYK1$:G
OSUB1460:GOSUB 1590
(1450) RETURN
(1460) S$=RIGHT$(STR$(S),LEN(STR$(
S))-1):HDRAW"C8"
(1470) SX=200
(1480) FORT=1TOLLEN(S$)
(1490) HDRAW"BM"+STR$(SX)+",.55"+NM
$(ASC(MID$(S$,T,1))-47)
(1500) SX=SX+15
(1510) NEXTT
(1520) S1$=RIGHT$(STR$(S1),LEN(STR
$(S1))-1):HDRAW"C5"
(1530) SX=200
(1540) FORT=1TOLLEN(S1$)
(1550) HDRAW"BM"+STR$(SX)+",.55;"+N
M$(ASC(MID$(S1$,T,1))-47)
(1560) SX=SX+15
(1570) NEXTT
(1580) RETURN
(1590) PW=P2*5:HDRAW"C8;BM155;"+ST
R$(150-PW)+";R10H5G5":P2=P2-1
(1600) IF P2=-1 THEN 1780
(1610) RETURN
(1620) S$=RIGHT$(STR$(S),LEN(STR$(
S))-1):HDRAW"C8"
(1630) SX=200
(1640) FORT=1TOLLEN(S$)
(1650) HDRAW"BM"+STR$(SX)+",.85"+NM
$(ASC(MID$(S$,T,1))-47)
(1660) SX=SX+15
(1670) NEXTT
(1680) S2$=RIGHT$(STR$(S2),LEN(STR
$(S2))-1):HDRAW"C6"
(1690) SX=200
(1700) FORT=1TOLLEN(S2$)
(1710) HDRAW"BM"+STR$(SX)+",.85;"+N
M$(ASC(MID$(S2$,T,1))-47)
(1720) SX=SX+15
(1730) NEXTT
(1740) RETURN
(1750) PW=P1*5:HDRAW"C8;BM170;"+ST
R$(150-PW)+";R10H5G5":P1=P1-1:
(1760) IF P1=-1 THEN 1910
(1770) RETURN
(1780) HDRAW"C8":HLINE(170,5)-(240
,20),PSET,BF:HDRAW"C0":HLINE(170
,5)-(240,20),PSET,B:HPRINT(22,1)
,"STOP":HDRAW"C8;BM"+STR$(X2)+",
109;XMN$(2,M2);":
(1790) FORT=1TO1000:NEXTT:HDRAW"C8
":HLINE(170,5)-(240,20),PSET,BF:
HDRAW"C0":HLINE(170,5)-(240,20),
PSET,B:HPRINT(22,1),"WHITE"
(1800) HDRAW"C8":S=S1:FORT=TM TO 3
0 STEP 1:PLAY"02L255T255GEF":S1=
S1+5:HLINE(T,165)-(T,170),PSET:N
EXTT:GOSUB 1460
(1810) S=S1:FOR Z=P1 TO -1 STEP -1
:PLAY"02L255;T255;GEF":S1=S1+25:
PW=Z*5:HDRAW"C8;BM170;"+STR$(150
-PW)+";R10H5G5":NEXT:GOSUB 1460
(1820) HDRAW"C8":HPRINT(25,12),"RO
UND :"+STR$(RD):HDRAW"C0":HPRINT
(25,12),"ROUND :"+STR$(RD+1)
(1830) RD=RD+1:R1=R1+1:GOSUB 2530
(1840) IF R1=6 THEN 2270
(1850) PW$="F5L10E5BD5":HDRAW"C6":
HDRAW"BM160,75":FORT=1TO15:HDRAW
PW$:NEXTT
(1860) HDRAW"C5":HDRAW"BM175,75":F
ORT=1TO15:HDRAWPW$:NEXT
(1870) IF RD=5 THEN GOSUB 2130
(1880) HDRAW"C3":FORT=30 TO 220 ST
EP 3:HLINE(T,165)-(T,170),PSET:
NEXTT:P1=15:P2=15:TM=220:
(1890) HDRAW"BM"+STR$(X1)+",109;C8
;XMN$(1,M1);":X1=65:X2=100
(1900) M1=1:M2=1:GOTO 940
(1910) HDRAW"C8":HLINE(170,5)-(240
,20),PSET,BF:HDRAW"C0":HLINE(170
,5)-(240,20),PSET,B:HPRINT(22,1)
,"STOP":HDRAW"C8;BM"+STR$(X1)+",
109;XMN$(1,M1);":
(1920) FORT=1TO1000:NEXTT:HDRAW"C8
":HLINE(170,5)-(240,20),PSET,BF:

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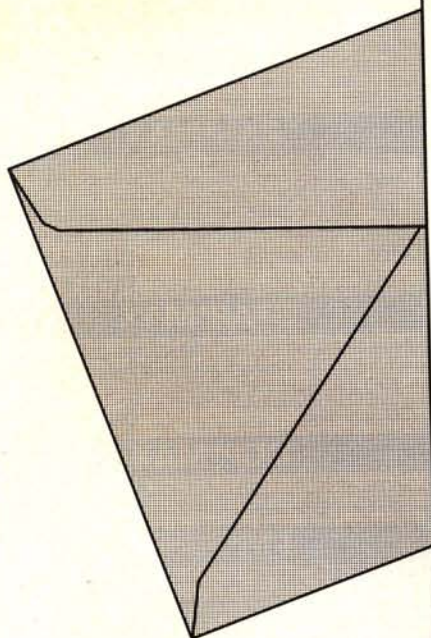
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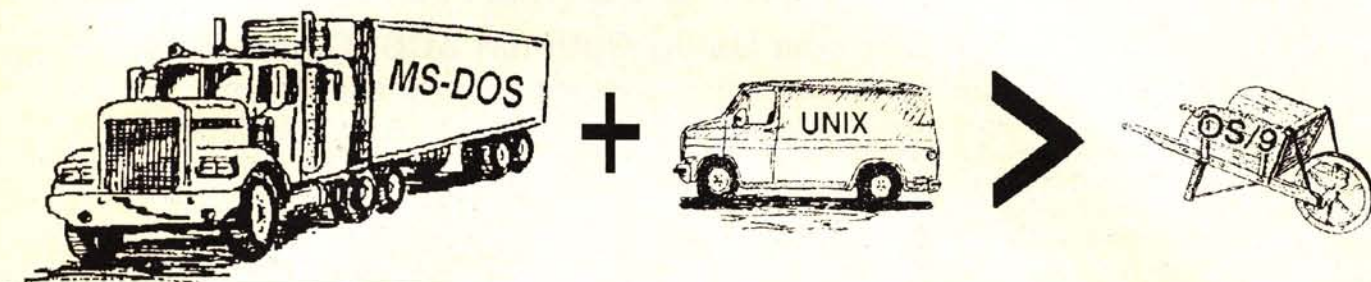
```

HDRAW"C0":HLINE(170,5)-(240,20),
PSET,B:HPRINT(22,1),"PURPLE"
(1930)HDRAW"C8":S=S2:FORT=TM TO 3
0 STEP-1:PLAY"02L255:T255GEF":S2
=S2+5:HLINE(T,165)-(T,170),PSET:
NEXTT:GOSUB 1620
(1940)S=S2:FORT=P2 TO -1 STEP -1:
PLAY"02L255T255GEF":S2=S2+25:PW=
T*5:HDRAW"C8:BM155,"+STR$(150-PW
)+":R10H5G5":NEXT:GOSUB1620
(1950)HDRAW"C8":HPRINT(25,12),"RO
UND :"+STR$(RD):HDRAW"C0":HPRINT
(25,12),"ROUND :"+STR$(RD+1)
(1960)RD=RD+1:R2=R2+1:GOSUB 2530
(1970)IF R2=6 THEN 2220
(1980)IF RD=5 THEN GOSUB 2130
(1990)PW$="F5L10E5BD5":HDRAW"C6":
HDRAW"BM160,75":FORT=1TO15:HDRAW
PW$:NEXT
(2000)HDRAW"C5":HDRAW"BM175,75":F
ORT=1TO15:HRAWPW$:NEXT
(2010)HDRAW"C3":FORT=30 TO 220 ST
EP 3:HLINE(T,165)-(T,170),PSET:N
EXTT:P1=15:P2=15:TM=220
(2020)HDRAW"BM"+STR$(X2)+",109:C8
:XMN$(2,M2)":X1=65:X2=100
(2030)M1=1:M2=1:GOTO 950
(2040)IF P2>P1 THEN 1910
(2050)IF P1>P2 THEN 1780
(2060)FORA=1TO2
(2070)IF BUTTON(2)=1 AND JOYSTK(2
)=63 AND X1>X2-15 THEN P1=0:B2=0
:C2=1:GOTO 1220
(2080)NEXTA:RETURN
(2090)FORA=1TO2
(2100)IF BUTTON(0)=1 AND JOYSTK(0
)=0 AND X1>X2-15 THEN P3=P2:P2=0
:B1=0:C1=1:GOTO1210
(2110)NEXTA:RETURN
(2120)GOTO 2120
(2130)HDRAW"C8":HLINE(30,50)-(140
,150),PSET,BF:HDRAW"C0":HLINE(30
,50)-(140,150),PSET,B
(2140)'screen 2
(2150)HCIRCLE(30,140),5,2,1,0,.25
(2160)FORT=40 TO 130 STEP 10:HCIR
CLE(T,140),5,2,1,0,.50:NEXTT:HCI
RCLE(140,140),5,2,1,0,.25,.50
(2170)HDRAW"C2":HLINE(31,140)-(31
,149),PSET:HLINE-(139,149),PSET:
HLINE-(139,140),PSET:HPAINT(90,1
45),2,2
(2180)HDRAW"C3":HDRAW"BM55,140:U3
0:C0:BH5L20D5F5E5F5E5F5U5C3R65BD
5L10L45BL5L5BD5R25BR10R30U5D10L6
5R65D15U25C0U5D5E5F5E5F5U10L15C3
E5U30H15R5F10U10C0R10U5L55F5R50L
45G5L60R5C3D5E5R10G10D25F10"
(2190)HCIRCLE(50,110),5,0,1,.75,0
:HCIRCLE(125,110),5,0,1,.50,.75
(2200)RETURN
(2210)'purple wins
(2220)WIDTH 32:CLS:PRINT"PURPLE H
AS WON THE ROUND, THE MATC
H, AND HIS
BLACK BELT !":
(2230)PRINT"WHITE WAS AT HIS "+B
T$(R1)
(2240)PRINT"WHITE SCORE :":S1:PRI
NT"PURPLE SCORE :":S2
(2250)POKE65496,0:GOTO2560
(2260)'white wins
(2270)WIDTH 32:CLS:PRINT"WHITE H
AS WON THE ROUND, THE MATC
H, AND HIS
BLACK BELT !":
(2280)PRINT"PURPLE WAS AT HIS "+B
T$(R2)
(2290)PRINT"WHITE SCORE :":S1:PRI
NT"PURPLE SCORE :":S2
(2300)POKE65496,0:GOTO2570
(2310)IF CM=1 THEN 2430 ELSE IF J
OYSTK(3)=63 THEN GOSUB 1330:D2=1
:HDRAW"BM"+STR$(X2)+",109:C6:XMN
$(2,7)":M2=7:RETURN
(2320)RETURN
(2330)IF JOYSTK(1)=63 THEN GOSUB1
320:D1=1:HDRAW"BM"+STR$(X1)+",10
9:C5:XMN$(1,7)":M1=7:RETURN
(2340)RETURN
(2350)IFCM=1 THEN 2450 ELSEIF JOY
STK(3)=0 THEN GOSUB1330:J2=1:HDR
AW"BM"+STR$(X2)+",109:C6:XMN$(2,
6)":M2=6:RETURN
(2360)RETURN
(2370)IF JOYSTK(1)=0 THEN GOSUB13
20:J1=1:HDRAW"BM"+STR$(X1)+",109
:C5:XMN$(1,6)":M1=6:RETURN
(2380)RETURN
(2390)IF F2=1 THEN RETURN ELSEA2=
36:B2=36:C2=0:IF X2>X1+15 THEN A
2=0
(2400)IF X1+17>X2 AND X1+15<X2 TH
EN C2=1:A2=36:B2=63:GOTO 2410 EL
SE IF X1+17>X2 THEN C2=1:A2=36:B
2=36:GOSUB 2420
(2410)GOTO 1050
(2420)IF D1=0 AND RND(4)=1 THEN B
2=63:RETURN ELSE IF J1=0 AND RND
(4)=2 THEN B2=0:RETURN ELSE IF R
ND(4)=3 THEN A2=63:RETURN ELSE R
ETURN
(2430)IF RND(5)=5 THEN GOSUB1330:
D2=1:HDRAW"BM"+STR$(X2)+",109:C6
:XMN$(2,7)":M2=7:IF P2=0 THEN P
2=P3:GOTO2320 ELSE GOTO 2320
(2440)GOTO 2320
(2450)IF RND(5)=1 THEN GOSUB1330:
J2=1:HDRAW"BM"+STR$(X2)+",109:C6
:XMN$(2,6)":M2=6:GOTO2360
(2460)GOTO 2360
(2470)IF CM=1 THEN GOTO 2490 ELSE
IF JOYSTK(2)=63 THEN F1=1:T1=0:
GOTO1180
(2480)RETURN
(2490)IF RND(5)=3 THEN F1=1:T1=0:
GOTO1180
(2500)RETURN
(2510)IFRND(5)>4 THEN RETURN ELS
E IF JOYSTK(0)=0 THEN F2=1:T2=1:
GOTO1210 ELSE RETURN
(2520)RETURN
(2530)HDRAW"C=BT(R1)":HLINE(263,
144)-(300,149),PSET,BF:HCIRCLE(2
82,146),4,8
(2540)HDRAW"C=BT(R2)":HLINE(263,
128)-(300,133),PSET,BF:HCIRCLE(2
82,130),4,8
(2550)RETURN
(2560)'end
(2570)PRINT:PRINT"WOULD YOU LIKE
TO TRY AGAIN, NINJA ? (Y/N)"
(2580)A$=INKEY$:IF A$<>"Y" AND A$
<>"N" THEN GOTO 2580
(2590)IF A$="Y" THEN RUN ELSE PRI
NT"GOOD BYE":END

```


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Reading and Writing

by Greg Law
Technical Editor

Despite some similarities between reading and writing data files with BASIC09 and reading and writing files with Disk BASIC, there are big differences between OS-9 and Disk BASIC. For example, the statement to open a file with Disk BASIC is:

```
OPEN #1,"R","DATAFILE/DAT"
```

One problem with using this statement is that the programmer is responsible for making sure the same path number is not used more than once. A second problem is that you are forced to open a sequential file for reading *or* writing and a direct access file for reading *and* writing. BASIC09 handles these peculiarities quite elegantly:

```
DIM Path:BYTE
OPEN #Path,"datafile.dat":READ
```

The access mode can be READ, WRITE or UPDATE. The path number of the opened file is assigned to the variable Path. Also, the access mode specifies only the ability to read from and/or write to the file. Whether the file is accessed sequentially, randomly or a combination of the two is of no concern to BASIC09.

Sequential Access Files

A *sequential access* file is stored as a continuous stream of random length data. A text file is a common example of a sequential access file. A drawback with

this type of file is that the data must be read and written in a continuous stream. There is no way to read any specific portion, or record, without reading all of the records preceeding it.

With BASIC09, there are three sets of I/O commands at your disposal: PRINT and INPUT, READ and WRITE, and PUT and GET. PRINT and INPUT are intended to be used with text files and character-based devices such as the keyboard, video and printer. READ and WRITE are intended to be used with binary files with random length records.

In each of this month's listings we have declared a data structure containing a string (Name) that can hold up to 10 characters and an integer (Number). Instead of using OPEN, which will open an existing file, we must use CREATE to create a new file. Even though Rec.Name is declared as a string of 10 characters, we will assign only eight characters to it. The reason for this will become apparent a little later.

To get a feel for sequential access files, enter Listing 1 and run it. When the program has finished running, use the dump command from OS-9 Level I or the *Developer's Package* to examine the contents of file1.dat. As you can see, each line of text is terminated with a carriage return (\$0D). The file created is completely readable and doesn't contain any strange control characters except the carriage returns. The integer variable (Count) is stored in the file as an ASCII digit. The PRINT command is perfect for printing data on the screen or printer. It is also perfect for creating ASCII text files because the data written is a continuous stream of ASCII text — no control characters are imbedded in the file to separate the records.

There is, however, a problem with this method. A program cannot read each variable as it was written to the file. If we use INPUT, it will read the entire string RECORD #1 and assign it to Rec.Name. The program

cannot easily tell the difference between the string (Rec.Name) and the digit (Rec.Number). To see this for yourself, enter and run Listing 2. Obviously PRINT and INPUT are impractical for use with files in which we want to store numbers as well as text items. But the pair works perfectly with ASCII text files in which all characters are to be interpreted as strings.

Contrast this with the WRITE command. Enter Listing 3 and run it. When the program has finished running, use the dump command to examine file2.dat. Unlike file1.dat, the stored variables, or fields, are separated with \$00. Also, the end of each record is terminated with a carriage return, and Rec.Number is printed to the file in ASCII. For this reason, we can easily create a BASIC09 program to read and write sequential access files with random-length records. Since the WRITE command automatically puts a \$00 at the end of each variable, it is easy to find any field within a record. And we already know each record is separated with a carriage return.

Look at Listing 3 again and compare it with the dump of file2.dat. The WRITE statement is used to write one entire record to the file. In Listing 3, the variables used to represent each field to be stored are separated with a semicolon. It is very similar to the PRINT statement except that \$00 is written to the file each time a semicolon is encountered in the WRITE statement. This makes it very easy to read each variable exactly as it was written. Enter Listing 4 and run it. As you can see, we changed CREATE to OPEN and WRITE to READ. All the variables are assigned exactly as they were in Listing 3.

Sequential access files work well in many cases but are unsatisfactory in others. Since the length of each record in such a file can be different, we cannot read an individual record without reading all of the records up to that point.

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

Direct Access Files

A *direct*, or *random access* file uses fixed-length records. That is, all records in the file contain the same number of bytes. This makes it easy to read or write any given record by specifying the record number. A drawback is that direct access files can cause wasted disk space since the data stored in each record may not completely fill that record. Enter Listing 5 and run it. Because we are using PUT, there is no need to tell BASIC09 to write each individual variable in the structure. All variables in the structure are written automatically.

Dump file3.dat when the program has finished running. In the printout you'll see that each record contains exactly 12 bytes. The first 10 bytes of each record hold the string for Rec. Name, and the last two bytes hold the binary value for Rec. Number. Examine the first 10 bytes in file3.dat closely. The first eight bytes

are RECORD # as we expected. The ninth byte (\$FF) is the string terminator character. The tenth byte is a "garbage" character used to *pad* the string so that it fills all 10 bytes of the field. This is the manner in which BASIC09 works with variable-length string data. It is important to remember that \$FF is used to terminate strings less than the specified size. In this case, a string of exactly 10 characters would not have the \$FF terminator at the end.

Now enter Listing 6 and examine it closely. You will notice that it is pretty much the same as Listing 5 except file3.dat is opened for READ and the program uses GET to read each record. We've set the loop to count backwards from 10 to 1 and inserted a SEEK statement. As you can probably guess, the program will read the records in reverse order.

Let's examine the SEEK statement a little closer. Records are numbered from zero and the loop starts with one. To account for this difference the program uses Count-1 to get the actual record number. But record num-

bers do not mean anything to BASIC09, so the offset is calculated by multiplying the record number by the size of each record, SIZE(Rec). To find the offset of any specific record, use (Count-1)*SIZE(Rec). Finally each record is read using GET and each of the variables is printed on the screen.

As stated before, because of the padding involved, direct access files can cause some wasted storage space. But it is easier and less time-consuming to find a specific record with direct access files than with sequential access files. Consider these trade-offs when writing your own programs.

Now that you understand the basic foundations of file I/O, create some programs of your own, or alter my listings to see what other discoveries you can make. We'll wrap it up next month with some hints, tips and a few traps to avoid.



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Listing 1: Print_Test

```

PROCEDURE Print_Test
0000    TYPE Record=Name:STRING[10]; Numb
er:INTEGER
0016
0017    DIM Rec:Record
0020    DIM Count:INTEGER
0027    DIM Path:BYTE
002E
002F    CREATE #Path,"file1.dat":WRITE
0043    Rec.Name:="RECORD #"
0056
0057    FOR Count:=1 TO 10
0067        Rec.Number:=Count
0073        PRINT #Path,Rec.Name; Rec.Number
0087    NEXT Count
0092
0093    CLOSE #Path
0099    END

```

Listing 2: Input_Test

```

PROCEDURE Input_Test
0000    TYPE Record=Name:STRING[10]; Numb
er:INTEGER
0016
0017    DIM Rec:Record
0020    DIM Count:INTEGER
0027    DIM Path:BYTE
002E
002F    OPEN #Path,"file1.dat":READ
0043
0044    FOR Count:=1 TO 10
0054        INPUT #Path,Rec.Name
0062        PRINT Rec.Name
006A    NEXT Count
0075
0076    CLOSE #Path
007C    END

```

Listing 3: Write_Test

```

PROCEDURE Write_Test
0000    TYPE Record=Name:STRING[10]; Numb
er:INTEGER
0016
0017    DIM Rec:Record
0020    DIM Count:INTEGER
0027    DIM Path:BYTE
002E
002F    CREATE #Path,"file2.dat":WRITE
0043    Rec.Name:="RECORD #"
0056
0057    FOR Count:=1 TO 10
0067        Rec.Number:=Count
0073        WRITE #Path,Rec.Name; Rec.Number
0087    NEXT Count
0092
0093    CLOSE #Path
0099    END

```

Listing 4: Read_Test

```

PROCEDURE Read_Test
0000    TYPE Record=Name:STRING[10]; Numb
er:INTEGER
0016
0017    DIM Rec:Record
0020    DIM Count:INTEGER
0027    DIM Path:BYTE
002E
002F    OPEN #Path,"file2.dat":READ
0043
0044    FOR Count:=1 TO 10
0054        READ #Path,Rec.Name,Rec.Number
006A        PRINT Rec.Name; Rec.Number
0079    NEXT Count
0084
0085    CLOSE #Path
008B    END

```

Listing 5: Put_Test

```

PROCEDURE Put_Test
0000    TYPE Record=Name:STRING[10]; Numb
er:INTEGER
0016
0017    DIM Rec:Record
0020    DIM Count:INTEGER
0027    DIM Path:BYTE
002E
002F    CREATE #Path,"file3.dat":WRITE
0043    Rec.Name:="RECORD #"
0056
0057    FOR Count:=1 TO 10
0067        Rec.Number:=Count
0073        PUT #Path,Rec
007D    NEXT Count
0088
0089    CLOSE #Path
008F    END

```

Listing 6: Get_Test

```

PROCEDURE Get_Test
0000    TYPE Record=Name:STRING[10]; Numb
er:INTEGER
0016
0017    DIM Rec:Record
0020    DIM Count:INTEGER
0027    DIM Path:BYTE
002E
002F    OPEN #Path,"file3.dat":READ
0043
0044    FOR Count:=10 TO 1 STEP -1
005A        SEEK #Path,(Count-1)*SIZE(Rec)
006D        GET #Path,Rec
0077        PRINT Rec.Name; Rec.Number
0086    NEXT Count
0091
0092    CLOSE #Path
0098    END

```


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by Kenneth Reighard, Jr.

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The plane and missiles are strings of text-screen graphics (ASCII codes 128 through 255). The animation is produced by printing a string of 32 black (CHRS(128)) characters at screen position 480.

The Listing: RAID

```

(0)' COPYRIGHT 1990  FALSOFT, INC
(1)GOTO32
(2)P=0:M=4:Z=1:S=0
(3)CLS0
(4)X=0
(5)PRINT@X,A$;
(6)FOR Y=1TORND(Z):PRINT@RND(30)+4
49,B$;:NEXT Y
(7)PRINT@480,C$;
(8)IF PEEK(1024+X)<>128OR PEEK(1024
+X+1)<>128THEN21
(9)POKE343,255:POKE344,255
(10)Q$=INKEY$
(11)IF Q$=CHR$(8)THENX=X-1:IFX<1TH
ENX=1
(12)IF Q$=CHR$(9)THENX=X+1:IFX>30T
HEN15
(13)IFX>0THENP=P+.3*X
(14)GOTO5
(15)SOUND200,1:S=S+1:P=P+50*X
(16)IFS<5THEN4
(17)S=0:P=P+100*X:PLAY"T302L4FL8A
P320+L4C#L2D0-L8AL4B0+CT2
(18)IFZ/2=INT(Z/2)THENM=M+1:PLAY"
P4T402L2AP100L8AGP100L4EGL2P100A
T2
(19)Z=Z+1:IFZ>4THENZ=4
(20)GOTO4
(21)PRINT@X,A$::PLAY"L3201FEFEGFA
D
(22)FOR Y=X TO X+448STEP32:PRINT@Y
,A$::FORQ=1TO50:NEXTQ:PRINT@Y,D$
::NEXT Y
(23)IFX>29THENX=29
(24)Y=480+X:PRINT@Y,A$::PLAYG$:PR
INT@Y,F$::PLAYG$:PRINT@Y,E$::PLA
YG$:PRINT@Y,D$::PLAYG$
(25)P=INT(P):PRINT@234,"SCORE="P;
(26)M=M-1:IFM=0THEN29
(27)PRINT@0,"":FOR Y=1TOM:PRINT@S
D$::NEXT Y
(28)FOR Y=1TO2000:NEXT Y:PRINT@224,
C$::GOTO4
(29)PRINT@0,"GAME OVER!!!";
(30)PRINT@480,"PLAY AGAIN (Y/N) ?
";
(31)Q$=INKEY$:IF Q$="Y"THEN2ELSEIF
Q$="N"THENPOKE65494,0:CLS:END:EL
SE31
(32)CLS4:PRINT@43," AIR RAID ":P
RINT@100," BY KENNETH REIGHARD J
R.":PRINT@454," PRESS KEY TO ST
ART ";
(33)A$=CHR$(251)+CHR$(243):B$=CHR
$(149):C$=STRING$(32,128):D$=STR
ING$(2,128):E$=STRING$(2,188):F$
=STRING$(2,191)
(34)G$="01L32DCDCDCDC
(35)POKE65495,0
(36)IF INKEY$=""THEN36
(37)GOTO2

```

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The Sound of the Touch

by William Barden, Jr.
Contributing Editor

What you can do with the CoCo without a lot of expensive external circuitry always amazes me. Would you believe there is a remote keypad with audio signal for under \$15, complete with cable? The unit is pictured in Figure 1. It allows you to enter any amount of numeric data from locations as far away as hundreds of feet from your CoCo 3. The response to the data entered is a beep for each digit or string of digits, or you can even send special audio codes. Or, you can use the output of your CoCo 3 to activate a remote device in response to the digits input. Also, you may put together any number of these devices to allow entry of data from many locations. Here are some possibilities for use of this device:

- A combination entry lock that activates an electrical door opener based upon your code.
- A hand-held remote data entry system that allows you to enter inventory data in a stockroom or warehouse.
- A remote entry device that prompts you for a series of inputs and then replies with a coded audio response to indicate a "go/no-go" condition.

The Keypad Design

The keypad design shown in Figure 2 consists of 12 momentary-contact, push-button switches such as Radio Shack's 275-1547 switches. Any similar type of switch

can be used in place of the Radio Shack switches. These are simple switches that are normally open but close when the button is pushed. The switches correspond to a normal telephone push-button keypad.

The output of the 12 switches feed into the four joystick inputs on the CoCo 3. The CoCo 3 allows for two joysticks, each with an up/down and right/left input. Output from the keypad is substituted for these four joystick inputs; more details about this in a moment.

In addition to the 12 switches, there is a small speaker in the unit. The speaker provides a short audio tone from your CoCo 3 to signal that a key has been pressed or to indicate other conditions. The speaker output comes from the AUDIO "RCA jack" of the CoCo 3. This output is in parallel to the sound output of any monitor connected to the system. Sound output is controlled by the SOUND command in BASIC. It should be noted that using the audio output of the CoCo 3 does not restrict this project from CoCo 1 and 2 users. If you are willing to forego audio feedback, or if you have the knowledge necessary to contrive feedback via other means, this project should work on the CoCo 1 and 2.

Joystick Inputs

The four joystick inputs are read by the JOYSTK command in CoCo 3 BASIC. For example, this code reads the four inputs:

```
100 A=JOYSTK(0)
110 B=JOYSTK(1)
120 C=JOYSTK(2)
130 D=JOYSTK(3)
```

Normally, each of the four variables — A, B, C and D — would hold a value of 0 through 63, representing the joystick position. In the keypad design, though, each of the four vari-

ables represents the key of a row. Variable A represents keys 1 through 3, Variable B keys 4 through 6, Variable C keys 7 through 9 and Variable D keys *, 0 and #. The value read for each of the four rows can be used to determine which of the three keys in a row has been pushed or if no key has been pushed.

Speaker signals are controlled by the SOUND statement in BASIC. For example, this BASIC line emits a one-twelfth-second high-pitched tone that signals a key press:

```
140 SOUND 200,1
```

The Keypad Hardware

The keypad hardware is simple and shouldn't pose any problems for most readers, even those not familiar with the horrors of hardware.

Drill twelve 5/16-inch diameter holes in

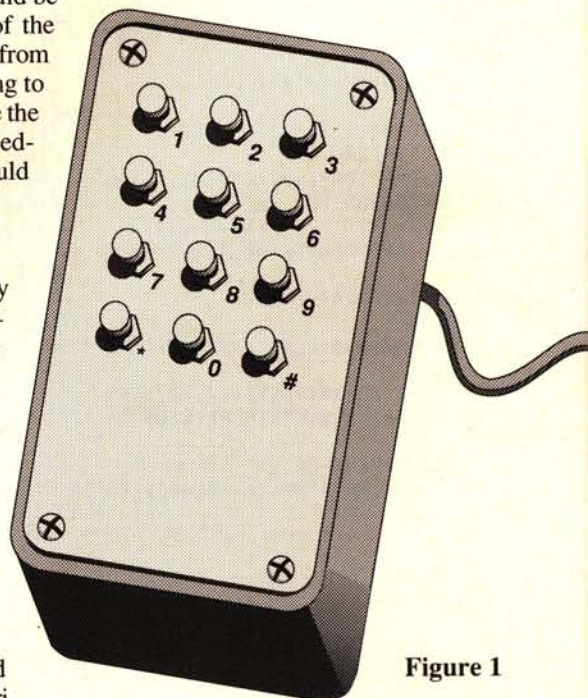


Figure 1

Bill Barden has written 35 books and hundreds of magazine articles about small computers. His newest Color Computer project, Connecting the CoCo to the Real World, is a book of CoCo interfacing projects. He has over 20 years experience in the industry on systems ranging from mainframes to micros.

the cover of a Radio Shack 270-233 construction box. The thin aluminum drills very easily. Mount all 12 switches with the nuts that come with them.

Drill three $\frac{5}{16}$ -inch diameter holes in the back of the plastic box. Glue a small speaker (40-245) to the box with adhesive (64-2307). Then drill a single $\frac{5}{16}$ -inch diameter hole at the other end of the box. This hole is for the cable.

Connect all top switch contacts together with a single continuous wire. One easy way to do this is to thread a single bare wire through the switch contact holes and then solder the wire at each of the 12 contact holes. Leave one end of the wire dangling from the last switch.

Now solder twelve $\frac{1}{4}$ -watt resistors to the remaining switch contacts. There are three different resistor values, 1K ohm (271-1321), 4.7K ohm (271-1330) and 22K ohm (271-1339). Connect the 1K ohm resistors to switches 1, 4, 7 and *, the 4.7K ohm resistors to switches

2, 5, 8 and 0, and the 22K ohm resistors to switches 3, 6, 9 and #. Note that the switches are reversed when viewed from the back.

Connect each set of three resistors together on the opposite end by soldering, leaving one lead for each of the four rows of switches.

Thread a six-conductor cable (278-374) through the hole in the back of the box. Strip off the insulation from the six wires. Connect one wire to each of the wires from the four rows of resistors, one wire to the common (ground) wire connecting all the switches, and the remaining wire to one terminal of the speaker. Connect a short length of unused wire from the second speaker terminal to the common (ground) lead. Note that the wires are color-coded. Make a note of colors versus connections so you'll be able to connect them properly at the other end of the cable.

Stuff all of the wires into the box and fasten the front cover with the screws pro-

vided. You may want to add electrical tape insulation (64-2340) between resistors and wires at appropriate places to make certain nothing shorts out. By the way, there will be no dangerous voltages present here to be concerned about.

You now have a box with connected cable, neatly packaged. The other end of the cable connects to *three cables* from the CoCo 3. The connection point should be close to the CoCo. The connections at this end involve eight resistors, seven wires from the CoCo and six wires of the cable. You can stuff these connections into a second construction box if you wish, or just make up a cable with connections neatly wrapped.

There are two joystick cables that connect to the right and left joysticks. These may be made using six-pin DIN plugs (274-020) and multi-conductor cable or by cannibalizing existing joystick cables. There is also a single "audio" type cable that con-

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William Barden Jr. Color Computer Products

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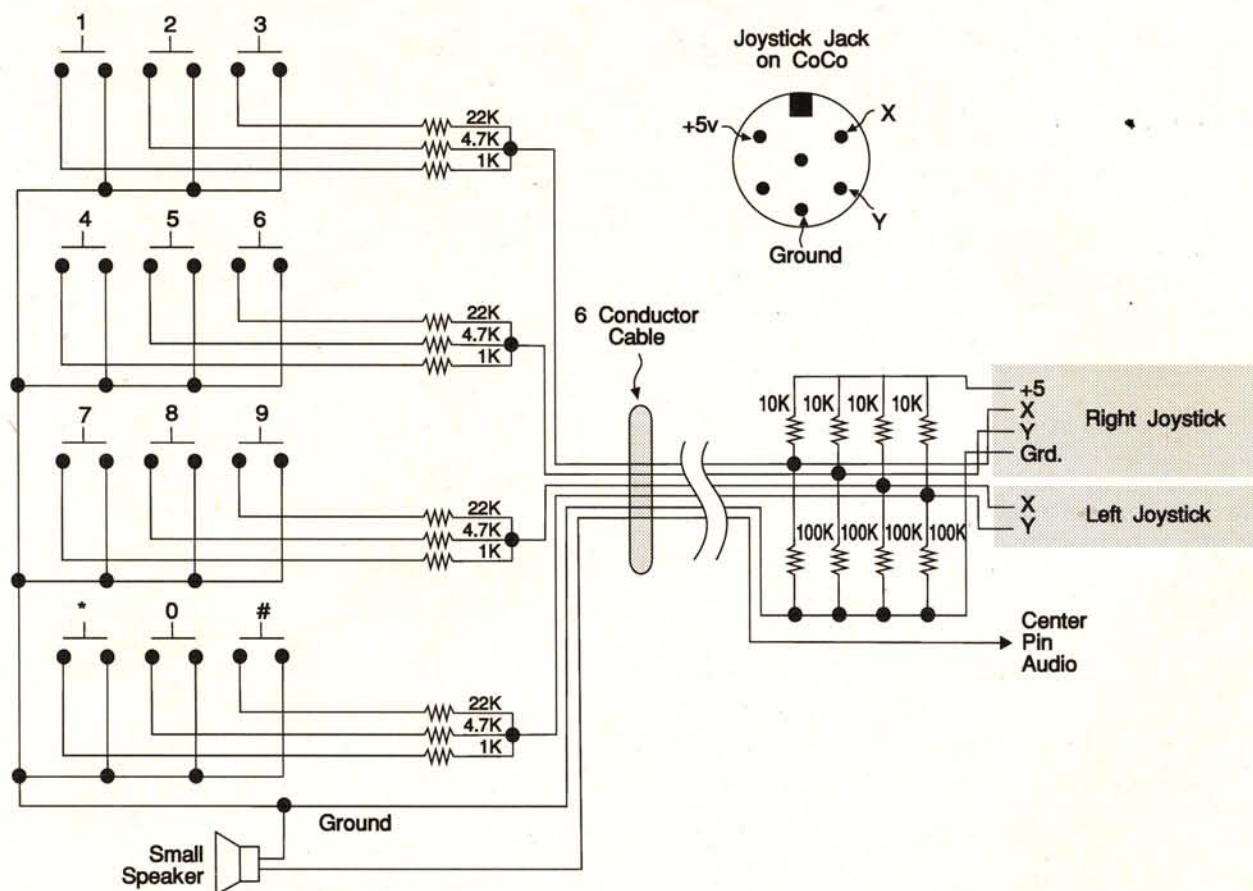


Figure 2

nects to the AUDIO output jack on the CoCo. Use a standard audio cable (43-2362) and cut and strip one end to expose two wires, the center conductor and shielded ground wire. Interconnect all wires and resistors as shown in Figure 2. You're now ready to test the keypad.

A Read Digit Subroutine

The BASIC subroutine shown in the list-

ing reads the next digit from the keypad by using JOYSTK statements. The key pressed is returned as a numeric code of 1 through 12 in Variable R. Each time a digit is read, a short tone is output to the speaker. The subroutine may be used to read the proper digits for a variety of applications. Use the * and # keys to indicate special actions. You can change the code for additional audio signaling to the speaker. For example, you might

want to beep a coded number of times to indicate received data and start of a new sequence.

Using the Relay Output

The keypad here can be used in conjunction with the cassette relay in the CoCo 3 to energize

electrical solenoids for door locks or other applications. You'll need two more wires in the remote cable to accomplish this. (One caution here: It's best not to use the relay to control high-voltage devices — stick to battery-operated applications.) For more information on relay applications, see my book *Connecting the CoCo to the Real World*.

Using Multiple Keypads

There's no problem in ganging several different keypads at once, provided that no two are being used simultaneously. If you have several remote keypads and a chance that two people will be using them at the same time, consider some type of entry protocol that authorizes only one user to enter data at a time. You could, for example, receive the first identification digit, reply by a beep equal to the number of the station, and then read that data. All other users would wait an appropriate period of time until the first user was finished. Inva-



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lid data can be signaled to any keypad by a series of eight rapid beeps.

How the Keypad Works

The principle behind the keypad operation is relatively simple. The four joystick inputs read a voltage from about 0 to +5 volts. The 100K and 10K ohm resistors for each of the four inputs form a *voltage divider* that divides the five-volt difference in proportion to the resistance. The voltage at the junction point is about $10/11$ of +5 volts, which is read as a value of 63 for a JOYSTK input. Pressing a key switch connects a second resistance in parallel with the 100K ohm resistor, lowering the voltage at the junction point to about 3.2 volts, 1.6 volts or zero volts, depending upon which of the three keys in a row is pressed. These voltages correspond to joystick values of about 40, 20 or 0. The values can be read by the JOYSTK commands and translated to the correct key number, based on the input channel and value read.

An Educational Application

In keeping with the theme of this issue, consider this application for the keypad. Instead of momentary switches, substitute

a sandwich of a plastic overlay sheet, ground plane of tinfoil, insulating cutout for 12 switch holes and a second set of 12 tinfoil contacts. You now have the workings for a keypad that can be used for interactive inputs and responses for educational applications. Simply use new overlays with appropriate symbols in place of the numeric labels for the keys.

Real World Connections

Response has been good from readers interested in my book *Connecting the CoCo to the Real World*. I'd like to apologize to readers who experienced some delays in getting the book after printing problems, but there are plenty of copies available now and they should reach you five to ten days after an order is received. □

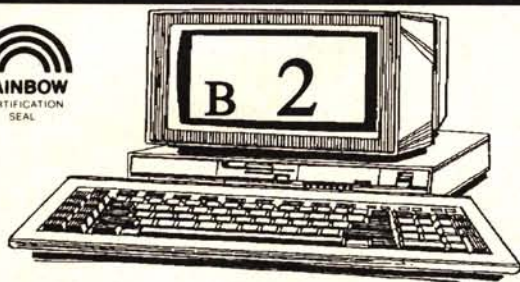
16K ECB



The Listing: KEYPAD

```

100 CLS
110 GOSUB 1000
120 IF R<>0 THEN PRINT R;
130 GOTO 110
1000 'READ KEYPAD SUBROUTINE
1010 R=0
1020 A=JOYSTK(0)
1030 B=JOYSTK(1)
1040 C=JOYSTK(2)
1050 D=JOYSTK(3)
1060 IF A<50 THEN GOTO 1080 ELSE
      IF B<50 THEN GOTO 1130 ELSE IF
      C<50 THEN GOTO 1160 ELSE IF D<50
      THEN GOTO 1190 ELSE GOTO 1070
1070 RETURN
1080 R=3: IF A<30 THEN R=2
1090 IF A<10 THEN R=1
1100 FOR I=1 TO 70: NEXT I
1110 SOUND 200,1
1120 GOTO 1070
1130 R=6: IF B<30 THEN R=5
1140 IF B<10 THEN R=4
1150 GOTO 1100
1160 R=9: IF C<30 THEN R=8
1170 IF C<10 THEN R=7
1180 GOTO 1100
1190 R=12: IF D<30 THEN R=11
1200 IF D<10 THEN R=10
1220 GOTO 1100
  
```



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Money 'n Math

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

Since this is the education issue, let's look at an educational program that takes advantage of most CoCo-compatible printers. I'm talking about the *Money Math Worksheet Generator*.

This program is actually the third worksheet generator I've written for the CoCo. The first, *MathGen1*, lets you create worksheets and coded answer sheets on standard tractor-feed paper for simple addition, subtraction, multiplication and division. The program provides an answer sheet to match your worksheet, which is a nice function. (Why bother having to figure out the problems yourself if you want to correct them for a student or child?)

MathGen2 lets you create written word problems. Neither *MathGen1* or *MathGen2*, however, allows an addition problem to be printed in a column of more than two numbers. Thus, you can only get

this:	23	and never this:	23
	+14		19
			36
			+14

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

Therefore I came up with a program that does just that.

While using a computer is a good way to sharpen math skills, most children still need to learn these same skills with a pencil

While using a computer is a good way to sharpen math skills, most children still need to learn these same skills with a pencil and paper at some point. Teachers have often spent hours creating such random worksheets for this purpose without a computer. Using a computer, of course, is much easier.

and paper at some point. Unfortunately, most math books only tend to have two or three pages on any given math skill. To really learn these math skills, it is necessary to have repeated exercises on the same skills. Teachers have often spent hours creating such random worksheets for this purpose without a computer. Using a computer, of course, is much easier.

With *MathGen3* I decided to stick solely with addition skills involving money. I wanted a program that would allow column

problems of from two to five numbers. (Later I'll tell you how to print sheets that do not print your numbers as decimals.) I also thought it would be nice if the CoCo could keep track of the number of lines per sheet so that the tractor-feed paper could run smoothly through the printer without needing constant readjustment.

I accomplished this mainly by printing a full-sized answer sheet with the problems repeated above the answer. This also makes looking at the problems and answers a little more logical. As an added bonus, *MathGen3* lets the program run without constantly readjusting the tractor-feed paper.

Using the Program

First line up the paper in your printer. The print head should be positioned about one-half inch below the top of the paper. The screen indicates whether or not you may choose from two to five numbers in each addition problem. When you have selected which you want by pressing the corresponding key, you are asked to type a number that will be the largest possible number generated by the computer. This controls the difficulty of the problems.

If your printer is already online, your papers will start printing. The program is designed to print using the enlarged print characters of most printers. On the printer I used with this program, the CHR\$ for enlarged or expanded print is CHR\$(14). Some printers use CHR\$(31) for enlarged print, so change Line 65 to:

```
65 PRINT#-2,CHR$(31):: REM
  INSERT ANY VALUE FOR ENLARGED
  PRINT ON YOUR PRINTER
```

Check your printer manual to determine which value or values create the expanded mode and substitute whichever values are needed in order to get that result. Keep in mind the columns are already set up to use

16K Extended

✓ 25	106
45	186
80	189
115	19
145	152
195	172
265	123
340	109
410	42
485	108
545	69
END	164

The Listing: MATHGEN3

```

1 REM*****
2 REM*      MONEY MATH      *
3 REM*      WORKSHEET GENERATOR *
4 REM*      BY FRED B. SCERBO *
5 REM*      COPYRIGHT (C) 1990 *

```

```

6 REM*      60 HARDING AVE. *
7 REM*      NORTH ADAMS,MA 01247 *
8 REM*****
10 DIM U(21,5)
15 NB$="####.##"
20 CLS0:SCREEN0,1:LC$=CHR$(175)+
CHR$(170):RC$=CHR$(165)+CHR$(175)
):EB$=CHR$(175)+CHR$(175):GOSUB2
5:GOTO30
25 CLS6:PRINTSTRING$(32,172):PO
KE1056,32:PRINT@33,"money":POKE
1062,32:PRINT@39,"math":POKE106
7,32:PRINT@44,"worksheet":POKE1
077,32:PRINT@54,"generator":POK
E1087,32:PRINT@64,STRING$(32,163
):CHR$(175):RETURN
30 FORI=0TO8:PRINT@127+(I*32),EB
$:NEXT:PRINT@133,CHR$(175):CHR$
(174):STRING$(18,172):CHR$(173):
CHR$(175):
35 PRINT@165,LC$;" (A) ADD TWO
":RC$:PRINT@197,LC$;" (B) A
DD THREE ":RC$:PRINT@229,LC$
;" (C) ADD FOUR ":RC$:PRINT

```

```

@261,LC$;" (D) ADD FIVE ":RC
$;:PRINT@293,LC$;" (E)XIT PROGRA
M ":RC$;
40 PRINT@325,CHR$(175):CHR$(171)
:STRING$(18,163):CHR$(167):CHR$(
175):
45 PRINT@384,STRING$(32,172):PO
KE1440,32:POKE1441,32:POKE1442,3
2:POKE1443,32:POKE1444,32:PRINT@
421,"press":POKE1450,32:PRINT@4
27,"desired":POKE1458,32:PRINT@
435,"category":POKE1467,32:POKE
1468,32
50 POKE1469,32:POKE1470,32:POKE1
471,32:PRINT@448,STRING$(32,163)
:STRING$(31,128):POKE1535,128
55 X$=INKEY$:KE=RND(TIMER):IFX$=
"A"THEN160ELSEIFX$="B"THEN270ELS
EIFX$="C"THEN370ELSEIFX$="D"THEN
475ELSEIFX$="E"THEN590ELSE55
60 GOTO20
65 PRINT#-2,CHR$(14):REM
INSERT ANY VALUE FOR ENLARGED
PRINT ON YOUR PRINTER

```

MVCanvas 2.0 - OS-9 Paint Program

Finally, a professional OS-9 Level II paint program is available for the Color Computer 3. **MVCanvas** not only supports true windows, **MVCanvas** is the **ONLY** Color Computer graphic editor that gives you more choices than just a 320 by 200 pixel, 16 color graphic resolution. *

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Offer expires September 30, 1990. See previous issues of Rainbow for product descriptions and reviews.

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these characters, so any other type of print may throw off the columns.

Custom Changes

If you do not want the program to print these problems as dollars and cents, change Line 15, which reads:

```
15 NB$="####.##"
```

Change it to:

```
15 NB$="#####"
```

Also change Line 125 from:

```
125 WW=WW*100:RETURN
```

to

```
125 RETURN
```

You must also change lines 135 and 140 from:

```
135 FORI=1T03:U(I+K,W)=RND(WW)/100:PRINT#-2," ":PRINT#-2,USING NB$:U(I+K,W):PRINT#-2," ":U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI:PRINT#-2,"":RETURN
```

```
140 FORI=1T03:U(I+K,W)=RND(WW)/100:PRINT#-2,"+":PRINT#-2,USING NB$:U(I+K,W):PRINT#-2," ":U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI:PRINT#-2,"":RETURN
```

to:

```
135 FORI=1T03:U(I+K,W)=RND(WW):PRINT#-2," ":PRINT#-2,USING NB$:U(I+K,W):PRINT#-2," ":U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI:PRINT#-2,"":RETURN
```

```
140 FORI=1T03:U(I+K,W)=RND(WW):PRINT#-2,"+":PRINT#-2,USING NB$:U(I+K,W):PRINT#-2," ":U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI:PRINT#-2,"":RETURN
```

In lines 135 and 140 you have eliminated the characters /100 from directly after RND(WW). This allows you to have problems that do not show a decimal. It also ensures the alignment remains correct.

Conclusion

Give *MathGen3* a try. In coming weeks I will introduce more programs that make use of a printer for educational purposes. Until then, keep your ideas and requests coming in. □

```
70 PRINT#-2,"NAME":STRING$(24,&H5F):"DATE":STRING$(7,95)
75 PRINT#-2," "
80 PRINT#-2,"SHEET IDENTIFICATIO
N NO.":SN(NC):PRINT#-2," "
85 RETURN
90 PRINT#-2,"-----ANSWE
R SHEET-----":PRINT#-2,
" "
95 PRINT#-2,"SHEET IDENTIFICATIO
N NO.":SN(NC):PRINT#-2," "
100 RETURN
105 FORI=1T03:PRINT#-2," ---
- ":NEXTI:PRINT#-2,"":RETURN
110 GOSUB25:FORI=127T0191STEP32:
PRINT@I,EB$:NEXT:PRINT@192,STR
ING$(32,172);
115 QK$(NC)="A":PRINT@133," ADDI
TION WORKSHEETS ":PRINT@224,"
INPUT NUMBER SPAN":PRINTS
TRING$(32,32):PRINT@256," (4
DIGITS-MAX.9999)":INPUTWW:IF WW
>9999THEN115ELSEIF WW=0THENRUN
120 SN(NC)=TIMER
125 WW=WW*100:RETURN
130 FORS=1T03:PRINT#-2,USING"##.
":S+K:PRINT#-2," ":NE
XTS:PRINT#-2,"":RETURN
135 FORI=1T03:U(I+K,W)=RND(WW)/100:PRINT#-2," ":PRINT#-2,USIN
G NB$:U(I+K,W):PRINT#-2," ":U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI
:PRINT#-2,"":RETURN
140 FORI=1T03:U(I+K,W)=RND(WW)/100:PRINT#-2,"+":PRINT#-2,USIN
G NB$:U(I+K,W):PRINT#-2," ":U(I+K,0)=U(I+K,0)+U(I+K,W):NEXTI
:PRINT#-2,"":RETURN
145 FORI=1T03:PRINT#-2," ":PR
INT#-2,USING NB$:U(I+K,W):PRINT
#-2," ":NEXTI:PRINT#-2,"":RET
URN
150 FORI=1T03:PRINT#-2,"+":PR
INT#-2,USING NB$:U(I+K,W):PRINT
#-2," ":NEXTI:PRINT#-2,"":RET
URN
155 FORI=1T03:PRINT#-2," ":PR
INT#-2,USING NB$:U(I+K,0):PRINT
#-2," ":NEXTI:PRINT#-2,"":RET
URN
160 REM ADD TWO
165 GOSUB110
170 GOSUB65
175 FORK=0T018STEP3
180 GOSUB130
185 W=1:GOSUB135
190 W=2:GOSUB140
195 GOSUB105
200 FORI=1T04:PRINT#-2," ":NEXTI
,K
205 FORI=1T06:PRINT#-2," ":NEXT
210 GOSUB580
215 GOSUB90
220 FORK=0T018STEP3
225 GOSUB130
230 W=1:GOSUB145
235 W=2:GOSUB150
240 GOSUB105
245 GOSUB155
250 FORI=1T03:PRINT#-2," ":NEXTI
,K
255 FORI=1T05:PRINT#-2," ":NEXT
260 RUN
265 REM ADD THREE
270 GOSUB110
```

```
275 GOSUB65
280 FORK=0T015STEP3
285 GOSUB130
290 FORW=1T02:GOSUB135:NEXT
295 W=3:GOSUB140
300 GOSUB105
305 FORI=1T04:PRINT#-2," ":NEXTI
,K
310 GOSUB580
315 FORI=1T08:PRINT#-2," ":NEXT
320 GOSUB90
325 FORK=0T015STEP3
330 GOSUB130
335 FORW=1T02:GOSUB145:NEXT
340 W=3:GOSUB150
345 GOSUB105
350 GOSUB155
355 FORI=1T03:PRINT#-2," ":NEXTI
,K
360 FORI=1T08:PRINT#-2," ":NEXT
365 RUN
370 REM ADD FOUR
375 GOSUB110
380 GOSUB65
385 FORK=0T012STEP3
390 GOSUB130
395 FORW=1T03:GOSUB135:NEXT
400 W=4:GOSUB140
405 GOSUB105
410 FORI=1T05:PRINT#-2," ":NEXTI
,K
415 GOSUB580
420 FORI=1T08:PRINT#-2," ":NEXT
425 GOSUB90
430 FORK=0T012STEP3
435 GOSUB130
440 FORW=1T03:GOSUB145:NEXT
445 W=4:GOSUB150
450 GOSUB105
455 GOSUB155
460 FORI=1T04:PRINT#-2," ":NEXTI
,K
465 FORI=1T08:PRINT#-2," ":NEXT
470 RUN
475 REM ADD FIVE
480 GOSUB110
485 GOSUB65
490 FORK=0T012STEP3
495 GOSUB130
500 FORW=1T04:GOSUB135:NEXT
505 W=5:GOSUB140
510 GOSUB105
515 FORI=1T04:PRINT#-2," ":NEXTI
,K
520 GOSUB580
525 FORI=1T07:PRINT#-2," ":NEXT
530 GOSUB90
535 FORK=0T012STEP3
540 GOSUB130
545 FORW=1T04:GOSUB145:NEXT
550 W=5:GOSUB150
555 GOSUB105
560 GOSUB155
565 FORI=1T03:PRINT#-2," ":NEXTI
,K
570 FORI=1T07:PRINT#-2," ":NEXT
575 RUN
580 CLS5:PRINT@192,STRING$(32,17
2);"now":POKE1251,32:PRINT@228,
"printing":POKE1260,32:PRINT@23
7,"coded":POKE1266,32:PRINT@243
,"answer":POKE1273,32:PRINT@250
,"sheets":STRING$(32,163);
585 RETURN
590 CLS0:SCREEN0,0:END
```


OS-9 Gets the Grades

by Dale L. Puckett
Contributing Editor

School bells are ringing and it's time for students and teachers to start keeping records for the new semester. *GradeBook* is designed to introduce you to practical BASIC09 application programming and help you keep all those records during the school year.

GradeBook is for teachers who need to keep track of students' grades on various assignments during the school year. Each file can keep track of 30 individual assignments for 24 students. If you record grades for more than 30 assignments in a semester, you can use separate files for each six week period. With a few changes in the names of the data fields, students can rewrite the *GradeBook* to keep a record of their performance in all of their classes.

Starting *GradeBook*

One design goal of most programmers today is to provide an application that can be used by anyone, with or without knowledge of computers and without reading a manual. *GradeBook* comes very close to meeting this goal, but I'll pass along a few hints to make sure you aren't led astray.

GradeBook is completely menu driven. It runs on a text-only screen — for speed — and does not use any code that requires you to have *Multi-View* installed. You should be able to run this program with OS-9 Level II fresh out of the box.

You can run the program from within BASIC09, or you can pack the code and run

it from any OS-9 prompt. To take the first approach, enter the lines below:

```
OS9: load basic09
OS9: basic09 #32k
B: load gradebook
B: run
```

Note that you must request 32K of memory to run *GradeBook* because of the size of the data structure we are using. Also note that the source file named *GradeBook* must be located in your current data directory when you start BASIC09. If you would rather run a packed version of *Gradebook*, type the following line after you have loaded the *GradeBook* source into BASIC09:

```
B: pack
```

BASIC09 stores the packed version in a file named *GradeBook* in your current execution directory /dd/CMDS. After you have run the pack command, you can exit BASIC09 by typing bye. You may run the packed program by typing the following commands at any OS-9 prompt:

```
OS9: chd /dd/GRADES
OS9: gradebook
```

The above sequence tells OS-9 that you have stored your grade book files in a directory named /dd/GRADES. You must always change your current data directory to the directory containing your grade book files before you run *GradeBook*.

Running *GradeBook*

The first thing you see when you run *GradeBook* is a small dialog window in the middle of your screen. It asks you for the name of the class. Because the program uses the name you enter as part of an OS-9 filename, it can contain no spaces and no more than 12 characters.

For example, Math 101 must be typed as Math101 or Math_101. If you type the latter, the program creates and initializes a file named *GradeBook.Math_101* in your current data directory.

After the grade book file is created or opened, the main menu pops up in the center of the screen. At this point you may choose one of these options: Add a student, Enter grades, Display a student's progress, Print the Gradebook, Edit or Delete a grade, or Quit. You select your choice by typing a number between 1 and 5. To quit, type 0.

For example, if you type 1 to add a student, the main menu disappears and another dialog box asks you for the student's last name. If you want to stop adding names, press ENTER in response to this prompt. Otherwise, type the student's last name and the program asks for the first name, address and other vital information. You may also add a 40-character comment to the student's record.

Each time you complete a student's entry, the program displays that information on screen briefly and then shows the dialog box again to take information for the next student. When you finish adding students to your gradebook and press ENTER at the Last Name prompt, the dialog box disappears and the main menu pops up again.

Each of the other menu functions works in a similar manner. For example, when you ask to enter grades, display a student's progress or edit a grade, the program uses one dialog box to ask you for the student's last and first name before moving you to another dialog box to prompt for additional information.

Because of the need to conserve memory, there is a finite limit to the length of the data that may be entered. For example, the street address may be only 20 characters long; the city is limited to 12 characters; and the description of each item graded may contain up to 14 characters. You may deter-

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mine the exact length limit of other data fields by looking at the TYPE statements at the beginning of the program listing.

Modifying GradeBook

As with most "KISSable OS-9" programs, *GradeBook* is a functional shell that gets you started. From this point you may add as much or as little as you want. For example, you might write a small utility program that copies an existing grade file for a class into a file for the next six week period. That utility would leave all the information about the student intact but would delete the grades entered during the previous six week period. This would eliminate the need to manually delete the records after copying a grade book file. With this utility in hand, you would only need the following two commands to move each class file into the new period:

```
OS9: copy Math_101 Math_101a
OS9: stripgrades Math_101a
```

You could even put these functions in a subroutine and add a Create New Period item to the main menu. Then you wouldn't need to run a separate program.

Another project to consider is one that would allow you to weigh individual scores. Essentially, we have given you the framework to do this by providing the data field type in each grade record. Enter the type of item, i.e., homework, quiz, exam, etc., in this field now. You can easily add another data field to hold a weighted score based on the type of the item. The weighted value can be computed and stored in the new data field in a subroutine. Another handy subroutine creates a student entry named Summary and stores the item description, type and class average for each item.

Students may want to modify the data types and printing routines so they can track all of their classes. The present version lets teachers track students; however, it's all a matter of names since the same data must be stored in either case. A proposed data type for student use is shown below:

```
TYPE vitals=used:BOOLEAN; stuname:
:STRING[12]; classname, teachname:
:STRING[12]; schoolname:STRING[
20]; city:STRING[12]; st:STRING[
2]; zip:STRING[5]; teachphone:S
TRING[12]; comments:STRING[40]
```

The data type grades would remain the same as in the original program. In the sample change mentioned I make the number of items and the size of each field in the data



The Listing: GradeBook

```
PROCEDURE GradeBook
0000 (* To help you keep track of your grades during the year
0038 (* Copyright 1990 DaleSoft
0052 BASE 1
0054
0055 TYPE vitals=used:BOOLEAN; class:STRING[12]; lname, fname:STRING
[12]; street:STRING[20]; city:STRING[12]; st:STRING[2
]; zip:STRING[5]; phone:STRING[12]; comments:STRING[40
]
00BC TYPE grades=empty:BOOLEAN; item:STRING[14]; score, avg:BYTE; itype
:STRING[8]
00E7 TYPE sturesc=info:vitals; grade(30):grades
0101 TYPE gbook=sturec(24):sturecs
0113
0114 DIM found:BOOLEAN
011B DIM work:sturecs
0124 DIM gradebook:gbook
012D DIM numstudents, numgrades:BYTE
0138 numstudents:=24 \numgrades:=30
0146
0147 DIM action, average, gbp, numitems, numavgs, newgrade:BYTE
0162 DIM index, gindex, runningtotal, count, printer, avgcount:INTEGER
017D DIM key:STRING[1]
0189 DIM classname:STRING[14]
0195 DIM title:STRING[64]
01A1 DIM pathname:STRING
01A8
01A9 (* Open database
01B9 ON ERROR GOTO 9000
01BF
01C0 (* Get name of Class first
01DA RUN gfx2("OWSet", 1, 20, 10, 40, 2, 0, 2)
01FC INPUT "Name of the class? ", classname
0217 RUN gfx2("OWEnd")
0224 pathname="GradeBook."+classname+":UPDATE"
0243 OPEN #gbp, pathname
024D 10 SEEK #gbp, 0
0259 GET #gbp, gradebook
0263 ON ERROR
0266
0267 LOOP
0269 key=""
0270 RUN gfx2("OWSet", 1, 20, 6, 40, 13, 0, 2)
0292 PRINT CHR$(12) \>(* Clear Screen
02A6 PRINT " The Rainbow Gradebook"
02C4 PRINT "===== "
02E8 PRINT
02EA PRINT "1 -- Add a student"
0300 PRINT "2 -- Enter grades"
0315 PRINT "3 -- Display a student's progress"
033A PRINT "4 -- Print Gradebook"
0352 PRINT "5 -- Edit <or Delete> a grade"
0373 PRINT "0 -- Quit"
0380 PRINT \ PRINT " Select by typing a number: ";
03A3 REPEAT
03A5 RUN inkey(key)
03AF UNTIL key<>" "
03BA action=ASC(key)-$30
03C7 EXITIF action=0 THEN
03D3 RUN gfx2("OWEnd")
03E0 GOTO 999
03E4 ENDEXIT
03E8 RUN gfx2("OWEnd")
03F5 ON action GOSUB 1000, 2000, 3000, 4000, 5000
0410 ENDOOP
0414
0415 999 RUN gfx2("OWSet", 1, 20, 10, 40, 4, 0, 2)
043A PRINT \ PRINT "Saving GradeBook file to disk."
045E SEEK #gbp, 0
0467 PUT #gbp, gradebook
0471 CLOSE #gbp
0477 RUN gfx2("OWEnd")
0484 RUN gfx2("clear")
0491 END
0493
0494 1000 (* Enter student names
04AD (* Move to first unused record
04CB index:=1
04D2 WHILE gradebook.sturec(index).info.used=TRUE DO
04E9 index=index+1
04F4 ENDWHILE
04F8
04F9 work=gradebook.sturec(index)
```



```

0507 work.info.class:="WORKING"
051C
051D LOOP
051F RUN gfx2("OWSet",1,10,10,60,12,0,2)
0541 PRINT "Strike <ENTER> at Last Name prompt to quit"
056F PRINT \ INPUT "Student's Last Name? ",work.info.lname
0595
0596 EXITIF work.info.lname="" THEN
05A8 RUN gfx2("OWEnd")
05B5 ENDEXIT
05B9
05BA work.info.class:=classname
05C9 INPUT "Student's First Name? ",work.info.fname
05EE INPUT "Student's Street Address? ",work.info.street
0617 INPUT "Student's City? ",work.info.city
0636 INPUT "Student's State? ",work.info.st
0656 INPUT "Student's Zip Code? ",work.info.zip
0679 INPUT "Student's Phone Number? ",work.info.phone
06A0 INPUT "Comments about this student? ",work.info.comments
06CC work.info.used:=TRUE
06D9 gradebook.sturec(index):=work
06E8 RUN gfx2("OWEnd")
06F5 GOSUB 1600
06F9 index:=index+1
0704 ENDOLOOP
0708 RETURN
070A
070B 1600 (* Print Vital Stats
0722 RUN gfx2("clear")
072F title:="Rainbow Gradebook: "+classname
074D PRINT USING "S80^",title
075A RUN gfx2("CurXY",2,4) \ PRINT "Student: "; gradebook.sturec
(index).info.lname: ", "; gradebook.sturec(index).info.fname
079F RUN gfx2("CurXY",2,5) \ PRINT "Address: "; gradebook.sturec
(index).info.street
07CF RUN gfx2("CurXY",11,6) \ PRINT gradebook.sturec(index).info.city
07F3 RUN gfx2("CurXY",11,7) \ PRINT gradebook.sturec(index).info.st
; " "; gradebook.sturec(index).info.zip
082B RUN gfx2("CurXY",2,8) \ PRINT "Phone: "; gradebook.sturec
(index).info.phone
085B RUN gfx2("CurXY",2,14) \ PRINT "Comments: "; gradebook.sturec
(index).info.comments
088C RETURN
088E
088F 2000 (* Enter grades
08A1 GOSUB 8000 \(* Go find student's entry
08BF IF found=FALSE THEN
08CA RETURN
08CC ENDIF
08CE
08CF (* Get copy of record
08E4 work:=gradebook.sturec(index)
08F2
08F3 (* Move to first unused Grade Entry
0916 gindex:=1
091D
091E WHILE gradebook.sturec(index).grade(gindex).empty=FALSE DO
0938 gindex:=gindex+1
0943 ENDWHILE
0947
0948 (* Put anything in "item" field for later test
0976 work.grade(gindex).item:="WORKING"
098E
098F LOOP
0991 RUN gfx2("OWSet",1,10,10,60,9,0,2)
09B3 PRINT "Strike <ENTER> for Item entry to quit"
09DC INPUT "Describe item graded? ",work.grade(gindex).item
0A04 EXITIF work.grade(gindex).item="" THEN
0A19 RUN gfx2("OWEnd")
0A26 ENDEXIT
0A2A
0A2B INPUT "Student's grade (0 to 100) on this item? ",work.grade
(gindex).score
0A66 INPUT "Type of item (e.g., homework,quiz, exam, etc.)? ",
work.grade(gindex).itype
0AA8
0AA9 (* Calculate average here
0AC2 runningtotal:=0 \numitems:=gindex
0AD1
0AD2 FOR count:=1 TO numitems
0AE3 runningtotal:=runningtotal+work.grade(count).score
0AF8 NEXT count
0B03
0B04 average:=runningtotal/numitems
0B10 work.grade(gindex).avg:=average
0B22 work.grade(gindex).empty:=FALSE
0B32 gindex:=gindex+1
0B3D RUN gfx2("OWEnd")
0B4A ENDOLOOP

```

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type the same as in the original program. This makes conversion easier if you are just learning to use BASIC09's powerful data-typing capabilities.

After you change this data type, you

As with most "KISSable OS-9" programs, GradeBook is a functional shell that gets you started. From this point you may add as much or as little as you want.

must go through the program and edit the lines that access those data types. For example, the line that sets the pathname used when opening the file would read:

```
pathname:="GradeBook."+stuname:UPDATE
```

A slightly more complex change is needed in the routine that prints the vital statistics. For example you need to change the line that reads:

```
PRINT "Student: "; gradebook.stu
rec(index).info.lname; ", "; gra
debook.sturec(index).info.fname
```

to

```
PRINT "Class: "; gradebook.sture
c(index).info.classname; "/" ; gra
debook.sturec(index).info.teachn
ame
```

Since the data type that holds the grades is exactly the same, the subroutines that deal with the grades do not need to be changed. The subroutine at Line 8000 that searches for the student's name, however,

```
00B4E
00B4F gradebook.sturec(index):=work
00B5E GOSUB 1600 \(* Display Student Info
00B79 GOSUB 2600 \(* Display Grade Info
00B92 RETURN
00B94
00B95 2600 (* Display grade list
00BAD RUN gfx2("CWAarea",33,2,47,21)
00BC7 RUN gfx2("clear")
00BD4 RUN gfx2("CurXY",1,1) \RUN gfx2("undlnon")
00BF6 PRINT "# "; "ITEM":
00C05 RUN gfx2("CurXY",26,1) \ PRINT "SCORE "; "AVG "; "TYPE"
00C30 RUN gfx2("undlnoff")
00C40
00C41 (* Now print grades
00C54 gindex:=1
00C58 WHILE gradebook.sturec(index).grade(gindex).empty=FALSE DO
00C75 RUN gfx2("CurXY",1,gindex+1) \ PRINT gindex;
00C92 RUN gfx2("CurXY",4,gindex+1)
00CA9 PRINT gradebook.sturec(index).grade(gindex).item;
00CBE RUN gfx2("CurXY",27,gindex+1)
00CD5 PRINT gradebook.sturec(index).grade(gindex).score;
00CEA RUN gfx2("CurXY",33,gindex+1)
00D01 PRINT gradebook.sturec(index).grade(gindex).avg;
00D16 RUN gfx2("CurXY",36,gindex+1)
00D2D PRINT gradebook.sturec(index).grade(gindex).itype
00D41 gindex:=gindex+1
00D4C ENDWHILE
00D50 key:=""
00D57 RUN gfx2("OWSet",1,6,21,30,1,0,2)
00D79 PRINT "Strike any key to continue";
00D98 REPEAT
00DA4 RUN inkey(key)
00DA4 UNTIL key<>""
00DAF RUN gfx2("OWEnd")
00DBC RUN gfx2("CWAarea",0,0,80,24)
00DD6 RETURN
00DD8
00DD9 3000 (* Check a student's progress
00DF9 (* Get students record
00E0F GOSUB 8000
00E13 IF found=FALSE THEN
00E1E RETURN
00E20 ENDIF
00E22 work:=gradebook.sturec(index)
00E30 GOSUB 1600 \(* Display Student Info
00E4B GOSUB 2600 \(* Display Student Grades
00E68 RETURN
00E6A
00E6B 4000 (* Print the Gradebook
00E84 OPEN #printer,"/p":WRITE
00E91
00E92 index:=1 \gindex:=1
00EA0 WHILE gradebook.sturec(index).info.used=TRUE DO
00EB7 title:="Rainbow Gradebook: "+classname+" -- "+gradebook.sturec
(index).info.fname+" "+gradebook.sturec(index).info.lname
PRINT #printer USING "S80^",title
PRINT #printer \ PRINT #printer \ PRINT #printer
PRINT #printer,"Item No. "; \ PRINT #printer,TAB(14); "Description"
;
PRINT #printer,TAB(30); "Score": \ PRINT #printer,TAB(40
); "Average";
PRINT #printer,TAB(50); "Type of Assignment"
PRINT #printer
WHILE NOT(gradebook.sturec(index).grade(gindex).empty) DO
00FB5 PRINT #printer,TAB(4); gindex;
00FC4 PRINT #printer,TAB(10);gradebook.sturec(index).grade(gindex
).item;
00FE2 PRINT #printer,TAB(32); gradebook.sturec(index).grade(gindex
).score;
1000 PRINT #printer,TAB(43); gradebook.sturec(index).grade(gindex
).avg;
101E PRINT #printer,TAB(50); gradebook.sturec(index).grade(gindex
).itype
gindex:=gindex+1
103B ENDWHILE
1046 PRINT #printer,CHR$(00C)
1055 index:=index+1
1060 gindex:=1
1067 ENDWHILE
106B CLOSE #printer
1071 RETURN
1073
1074 5000 (* Edit or Delete a record
1091 GOSUB 8000 \(* Find the Student
10A8 IF found=FALSE THEN
10B3 RETURN
10B5 ENDIF
```



```

1087
1088 (* Get record number to change
10D6 RUN gfx2("OWSet",1,10,10,60,2,0,2)
10F8 INPUT "Type the number of the grade you want to change: ",action
1131 RUN gfx2("OWEnd")
113E
113F IF action<numgrades OR NOT(gradebook.sturec(index).grade(gindex)
    ).empty) THEN
1160   gindex:=action \(* Action is Pointer to record to edit
118E ELSE
1192   RUN gfx2("OWSet",1,20,10,50,2,0,2)
11B4   PRINT "This record not in database!"
11D4   FOR count:=1 TO 5000 \NEXT count \(* Delay to read Message
1208   RUN gfx2("OWEnd")
1215   RETURN
1217 ENDIF
1219
121A RUN gfx2("OWSet",1,20,10,60,8,0,2)
123C PRINT "Type 0 at next prompt to delete record!"
1267 INPUT "What is the new grade for this item? ",newgrade
1294 IF newgrade=0 THEN
12A0   (* First find out how many entries in student's record
12D6   count:=1
12DD   WHILE NOT(gradebook.sturec(index).grade(count).empty) DO
12F6     count:=count+1
1301   ENDWHILE
1305   numitems:=count-1
1310
1311   FOR count:=action TO numitems-1
1326     gradebook.sturec(index).grade(count):=gradebook.sturec(
       index).grade(count+1)
134A   NEXT count
1355
1356   gradebook.sturec(index).grade(count).empty:=TRUE
136C   GOSUB 5500 \(* Go update averages
1385   PRINT "This item has been removed from Gradebook."
13B3   FOR count:=1 TO 5000 \NEXT count
13CF   RUN gfx2("OWEnd")
13DC   RETURN
13DE ELSE
13E2   gradebook.sturec(index).grade(gindex).score:=newgrade

```

needs to be changed to search for the class name instead. You don't even need to check the field holding the instructor's name.

You will need to change the names of several variables. For example, numstudents must become numgrades, and classname should be myname.

One last thought. We chose to handle the entire database in memory so we could get it from the disk or put it back with one simple statement. You may modify *GradeBook* so it handles only one student's record in memory at any one time. By doing this you can increase the number of grades for each student dramatically. If you do this, use a loop to read the student records from or write them to the disk.

With these hints, your conversion project should be just enough of a challenge to make it a valuable learning experience. I hope *GradeBook* helps you learn BASIC09 and gives you a handy tool at the same time. After you hone your skills with the language, you may convert *GradeBook* into a database program that handles data for an entirely different application.

Next month is the Graphics issue. Until then, keep on hacking!

□

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For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

```

13FA      INPUT "What is the new item Description? ",gradebook.sturec
          (index).grade(gindex).item
143A      INPUT "What is the new assignment type? ",gradebook.sturec
          (index).grade(gindex).itype
146D      GOSUB 5500 \(* Scores have changed, update averages
1498      PRINT "Record has been updated."
14B4      FOR count:=1 TO 5000 \NEXT count
14D0      RUN gfx2("OWEnd")
14DD      RETURN
14DF      ENDIF
14E1
14E2 5500  (* Update the average
          runningtotal:=0 \count:=1 \avgcount:=1
14FA
150F      WHILE NOT(gradebook.sturec(index).grade(count).empty) DO
1510          count:=count+1
1529      ENDWHILE
153A
1538      numitems:=count-1 \numavgs:=numitems
1539
154C      (* Recompute each average in student record
154D      WHILE avgcount<=numavgs DO
1578          runningtotal:=0 \numitems:=avgcount
1585          FOR count:=1 TO numitems
1594              runningtotal:=runningtotal+gradebook.sturec(index).grade
1595                  (count).score
15A6          NEXT count
          average:=runningtotal/numitems
          gradebook.sturec(index).grade(avgcount).avg:=average
          avgcount:=avgcount+1
15C1      ENDWHILE
15CC      RETURN
15CD
15D9      average:=runningtotal/numitems
15F1      gradebook.sturec(index).grade(avgcount).avg:=average
15FC      avgcount:=avgcount+1
1600      ENDWHILE
1602      RETURN
1603 8000  (* Find Student Name and move to record
162D      RUN gfx2("OWSet",1,10,10,60,3,0,2)
164F      INPUT "What is the student's last name? ",work.info.lname
167F      INPUT "What is the student's first name? ",work.info.fname
16B0      RUN gfx2("OWEnd")
16BD
16BE      index:=0
16C5      REPEAT
16C7
16C8      EXITIF index=numstudents THEN
16D5          RUN gfx2("OWSet",1,20,10,40,3,0,2)
16F7          PRINT "Record for "; work.info.fname; " "; work.info.lname
              : " not found!"
              FOR count:=1 TO 5000 \NEXT count \(* Delay to read Message
172C                  found:=FALSE
1760                  RUN gfx2("OWEnd")
1766                  RETURN
1773      ENDEXIT
1775
1779      index:=index+1
177A      UNTIL gradebook.sturec(index).info.fname=work.info.fname AND
1785          gradebook.sturec(index).info.lname=work.info.lname
              found:=TRUE
              RETURN
17BD
17C3
17C5 9000  (* Initialize gradebook, student info first
17F4      PRINT "Creating file GradeBook."; classname
1814      CREATE #gbpath,pathname
181E      work.info.used:=FALSE
182B      work.info.class:=classname
183A      work.info.lname:=""
1854      work.info.fname:=""
186E      work.info.street:=""
1890      work.info.city:=""
18AA      work.info.st:=""
18BA      work.info.zip:=""
18CD      work.info.phone:=""
18E7      work.info.comments:=""
191D
191E      (* Initialize individual items in student record
194E      FOR gindex:=1 TO numgrades
195F          work.grade(gindex).empty:=TRUE
196F          work.grade(gindex).item:=""
198E          work.grade(gindex).score:=0
199F          work.grade(gindex).avg:=0
19B0          work.grade(gindex).itype:=""
19C9      NEXT gindex
19D4
19D5      (* Store individual data in Grade Book array
1A01      FOR index:=1 TO numstudents
1A12          gradebook.sturec(index):=work
1A21      NEXT index
1A2C
1A2D      (* Now put the entire GradeBook into the file
1A5A      PUT #gbpath,gradebook
1A64      GOTO 10
1A68      END

```


Corrections

"Do-It-Yourself Database" (July 1990, Page 36): The table of contents incorrectly shows this as Part IV of the series. It is actually Part V; Part IV appeared in the May 1990 issue on Page 12.

"VEGAS at Your Fingertips" (June 1990, Page 12): The following modifications have been provided by the author for those users who would like to use the program on a CoCo 3 without a disk drive.

```
50 PCLEAR 8
60 FOR T=&HD00 TO &HD00+78
160 POKE &HD06,&H31:POKE &HD07,0
:POKE &HD0F,&H31:POKE &HD10,0:PO
KE &HD19,0:POKE &HD2B,&HA4:POKE
&HD2D,&H84
170 Z=1:FOR Q=&HE TO &H31 STEP &
H5
```

```
180 POKE &HD18,0
200 EXEC &HD00
220 POKE &HD2B,&H84:POKE &HD2D,&
HA4:HCLS 15:GOSUB 640:GOTO 820
830 POKE &HD06,&HE:POKE &HD0F,&H
E:POKE &HD18,&HE:EXEC &HD00:GOSU
B 790
840 X=&HE00:Y=&HE00:Z=&HE00:S=2
940 J=(E-1)*&H500+&HE00:K=(F-1)*
&H500+&HE00:L=(G-1)*&H500+&HE00
1540 IF X>&H35FF THEN X=X-&H2800
1550 IF X>&H35FF THEN Y=Y-&H2800
1560 IF Z>&H35FF THEN Z=Z-&H2800
1565 A$=HEX$(X):IF X<&H1000 THEN
A$="0"+A$
1566 B$=HEX$(Y):IF Y<&H1000 THEN
B$="0"+B$
1567 C$=HEX$(Z):IF Z<&H1000 THEN
C$="0"+C$
1580 POKE &HD06,D1:POKE &HD07,D2
:POKE &HD0F,D3:POKE &HD10,D4:POK
E &HD18,D5:POKE &HD19,D6
1590 EXEC &HD00:RETURN
```

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The Melting Pot

by Steve Blyn
Contributing Editor

When I was a student many years ago, I learned that America was a melting pot. This meant that all races, religions and cultures were encouraged to blend into one uniform people. This, in the theory current then, was what made America a strong nation.

Today, the emphasis has turned toward appreciating the diversity of America's peoples. The theory is that the differences in our many cultures add to our strength and greatness. A new emphasis is being placed on the contributions of minority groups. Positive role models are thought to be very important to minority students. Although many cultures are represented in traditional American history tests, few specialize in the contributions of specific minority groups.

This month's article is a blueprint for computer programs that teaches and reviews information about famous minority heroes and heroines. I have chosen 15 famous people from the group Black Americans. There are many other groups I hope you will include in versions of this program.

You may choose to use this program as it stands or add to it or use another minority group. If you want to add names and deeds, add new DATA lines with the information. Alter Variable X on Line 30 since it keeps track of the number of information pairs entered in the DATA statements.

The program operates by randomly choosing one of the famous people. The student presses ENTER until the correct choice for the person's accomplishments

appears. When the student believes the answer matches the question, he or she should press C instead of ENTER. A short, happy tune indicates a correct answer, and the next person's name appears on the screen.

Today, the emphasis has turned toward appreciating the diversity of America's peoples. The theory is that the differences in our many cultures add to our strength and greatness.

If an incorrect response is chosen, a suitable sound is issued and the next choice for that person's accomplishment appears. A short tune and the clue Next Round appears when the entire list has been viewed. This is the reason for the last DATA statement. The choices then continue until the correct answer is chosen.

I do not include scoring in this program, because I don't want to introduce any element of competitiveness or negativism. Because the program can be used by a wide

range of students covering many grade levels, I thought all items would sooner or later be mastered. You, of course, may want to include a scoring counter that should be placed within Line 160.

To construct additional programs and possibly make them into a series, start by saving the original. Load the program again and change the DATA statements to suit any other group of people. Save the new version and proceed in this manner with as many programs as you want to create.

By becoming familiar with famous people from any minority group, all children should benefit. Children from that particular group gain additional knowledge and self-respect. Other children learn that all peoples have contributed to building our country.

The students that tested this program enjoyed compiling a list of famous people and their accomplishments. Several students were interested in learning more about some of the famous people, and others were interested in researching different minority groups for additional programs. □

16 K Extended

✓	90	233
	180	84
	220	74
	END	239

The Listing: AMERICAN

10 REM "FAMOUS BLACK AMERICANS"
20 REM "STEVE BLYN, COMPUTER ISLAND,
STATEN ISLAND, NY, 1990"

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.


```

30 G=RND(-TIMER):X=16:DIM B$(X),
A$(X)
40 FOR T=1 TO X:READ A$(T),B$(T)
:NEXT T
50 CLS:SOUND 230,3:T=0:PRINT@19
2,"":R=RND(X-1)
60 PRINT@34," famous black am
ericans ":PRINT@192,A$(R);
70 FOR A=1120 TO 1151:POKE A,255
:NEXT A
80 EN$=INKEY$
90 IF EN$=CHR$(13) THEN T=T+1:GO
TO 130
100 IF EN$="C" THEN 160
110 IF EN$="Q" THEN 260
120 GOTO 80
130 PRINT@224,"":PRINT@224,B$(T)
:
140 IF T=X THEN T=0:PLAY"O2L6GFE
DC"

```

```

150 GOTO 80
160 IF B$(T)=B$(R) THEN PLAY"O3L
50FEDCCC":PRINT@362," correct !
":FOR H=1 TO 1000:NEXT H:GOTO 5
0
170 IF B$(T)<>B$(R) THEN PLAY"O1
L5B-B-":GOTO 80
180 DATA PETER SALEM,REVOLUTIONA
RY WAR HERO,BENJAMIN BANNEKER,ON
E OF THE FIRST CLOCKMAKERS
190 DATA JAMES BECKWORTH,SCOUT
WHO RODE WITH KIT CARSON,SOJOURN
ER TRUTH,FAMOUS SPEAKER AGAINST
SLAVERY
200 DATA HARRIET TUBMAN,RAN THE
UNDERGROUND RAILWAY,NAT WOOD,FAM
OUS COWBOY-DEADWOOD DICK
210 DATA BILL PICKETT,INVENTED T
HE MODERN RODEO,LEWIS LATIMER,W
ORKED ALONG WITH THOMAS EDISON

```

```

220 DATA MATHEW HENSON,WENT WITH
PEARY TO NORTH POLE,DORIE MILLE
R,WORLD WAR II HERO
230 DATA RALPH BUNCH,WINNER OF N
OBEL PEACE PRIZE,DR. CHARLES DRE
W,INVENTED BLOOD PLASMA STORAGE
240 DATA PERCY JULIAN,INVENTED T
REATMENT FOR ARTHRITIS,A. PHILIP
RANDOLPH,EARLY LEADER IN LABOR
MOVEMENT
250 DATA INMAN PAGE,PRESIDENT OF
4 BLACK COLLEGES,END,NEXT ROUND
260 CLS:END

```

Two-Liner Contest Winner . . .

This program simulates a stop watch. It continues until 12:60:60:26. Press RETURN to stop the watch.

The Listing:

```

1 CLS:PRINT@107,"STOP WATCH":PRI
NT" PRESS <S> TO STOP":F
ORO=1T0650:NEXTO:FORW=1T012:FOR
X=1T060:FORY=1T060:FORZ=1T026:C
LS:PRINT@135,W-1;"":X-1;"":Y-1
;"":Z-1:A$=INKEY$:IFA$="S"THENG
OSUB2ELSENEXTZ:NEXTY:NEXTX:NEXTW
:END
2 CLS:PRINT@322,"STOPPED: TIME-"
:W-1;"":X-1;"":Y-1;"":Z-1:FOR
E=1T01500:NEXTE:END

```

*Eric Flailes
Hobe Sound, Florida*

For this winning two-liner contest entry, the author has been sent copies of *The Fourth Rainbow Book of Adventures* and the accompanying tape.

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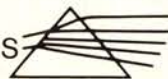
— CoCo Clipboard, Sept/Oct 1989.

ADOS-3 (reviewed July 1987)

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The Assembly Line,

Part IV: The Moving Feast

by William P. Nee

This month we look at a simple simulation and see how to graphically portray the results over a period of time.

Simulations are great projects for a computer. You define a set of rules and show the result, usually within a one- or two-dimensional array. The computer really helps to demonstrate results over a long period of time; where it may take several minutes to go from one generation to the next, the computer can do this in seconds. The result is more like a movie, or an old-time flicker, and we can interpret and understand the meaning more easily.

Rules may be as simple or complex as you want. You can simulate movement, birth, death, food supply — whatever your imagination allows. These rules may be based on scientific principles such as the movements of planets or just “what ifs.” The random feature of computers is most helpful in assigning probabilities to different events; you can experiment with the odds, see which ones work best and which ones wipe out everything.

In a future article I'll discuss a large scale simulation with life, birth, death, hunter and hunted, but for now let's look at a simple example.

Our rules were first developed by David Griffith of the University of Wisconsin. In this simulation the cells of a two-dimen-

sional array are given a random state or value between 0 and 15. In each generation period every cell checks its neighbors (to the top, bottom, right and left); if any cell has a value exactly one higher than its neighbor, it eats that cell, replacing it with its own state. A cell of value 10 replaces a cell with a value of 9, or a cell of value 1 replaces a cell with a value of 0. Everything wraps around so that a cell of value 0 replaces a cell of value 15. This wrap-around also applies to all the borders. A cell on the right edge that wants to check its right neighbor actually winds up looking at the first cell on the left in that row.

In summary, our rules are:

```
VALUE=CELL(H,V)+1
IF CELL(H,V-1)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE
```

or

```
IF CELL(H-1,V)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE
```

or

```
IF CELL(H+1,V)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE
```

or

```
IF CELL(H,V+1)=VALUE THEN
CELL(H,V)=VALUE:CONTINUE
GOTO NEXT CELL
```

Listing 1 is a BASIC program using these rules within a 31-by-31 array. Notice that increasing the cell value by 1 is actually a wrap-around ($15+1=0$) and that cell loca-

tions are also wrapped ($((31+1)\text{AND } 31=0)$). It is also necessary to use a second array to store the new states while checking old states. And since there are only four colors (0-3), every cell's status is AND 3 to get its color before plotting.

If you run this simulation long enough, one of two things happens — about 25 percent of the time the screen finally fills up with one color, or large chunks of color begin to form, eat up the debris and finally form a series of spirals. Run Listing 1 and see which effect you get. If you wait all night, you may begin to see those spirals. It's just taking too long to do all that computing, and the array size isn't really large enough to insure a good random display.

Now how about a program that fills a 128-by-96 array and only takes about two seconds to compute and display each generation. Of course this is only possible with machine language. Follow along with Listing 2. I used high RAM starting at #8000 for ARRAY1, and ARRAY2 is always #8000 higher. The bridge to high RAM is Location \$FFDF. Variables are stored in locations \$BD through \$C0. Lines 270 through 600 assign a state of RND (16)-1 to each cell, store this in ARRAY1 and ARRAY2 and then color each point.

I used a color table of 16 colors (Lines 2930 through 3000) since it's quicker to look up a color than multiply its value by #55. Lines 670 through 790 set up alternating pages to compute and show each generation. Because speed was critical, I didn't include any key-press check for terminating the program. You have to press the Reset button when you want to stop.

Computing the wrap-around locations for every cell's neighbors is very time-consuming. So I divided the array into five

Bill Nee bucked the snowbird trend by retiring to Wisconsin from a banking career in Florida. The success of his 13-part series "Machine Language Made Basic" (THE RAINBOW, July 1988 to July 1989) prompted him to continue writing articles on machine language programming.

parts: the top row, bottom row, left column, right column and center rectangle. Once the first four parts have been checked, the neighbors for the center rectangle don't wrap-around, and the program can zip right through them. So let's get some of those first parts out of the way.

Lines 800 through 880 get the status of the first cell, add 1 to it, AND with 15 (15+1=0), then save this value. The top neighbor of any cell in the top row is actually the cell in the bottom row 128*95 cells away, so check this location and compare it to VALUE. If it's the same, store this in the new array #S3000 away and go on to the next cell over; if it's not the same, check the neighbor to the left. The cells to the left and right are -1 and +1 from the current location; AND this with 127 to accomplish the wrap-around and then compare the status in those locations to VALUE. Again, if either one is the same, store it in the new array and go on to the next cell (lines 890 through 1090). Finally, check the bottom neighbor 128 cells or bytes away. This procedure continues for the whole top row.

Next, look at the bottom row (lines 1190 through 1580). This is done in almost the same manner as the top row except that the top neighbor is now -128 bytes back and the bottom neighbor is on the top row or -128*95 bytes away. Left and right neighbors are computed and checked in the same way.

Now for the easy part — the center rectangle (lines 1590 through 1970). Each neighbor is quickly located; top is -128 bytes away, left is -1, right is +1, and the bottom is +128 bytes. The important thing is to keep track of where we are. The very first location is over one row and down one row or +129 from the array start. Since we'll be checking the left and right columns later, the center rectangle is 1 to 126 across. After the first row has been checked, jump over two bytes to get to the next row. And we'll only be going down 1 to 94 rows.

Now there's just the columns (Lines

1980 through 2530) and we've already checked the top and bottom cells of each one, so start 128 bytes from the array beginning. The top neighbor for both columns is always -128 bytes away and the bottom neighbor always +128 bytes. The left neighbor of the left column is on the right side or +127 bytes and the right neighbor of the right column is on the left side or -127 bytes. The other neighbors are +1 and -1 bytes away. Check the first value in the left column and then move over +127 to get the first value in the right column. After doing this 1 to 94 times, both columns have been checked.

Finally, it's time to see the results. Again since speed is critical, I've decided to show each value on a byte-for-byte basis instead of setting each point according to its state. The first value in the new array is the two left-most color bits; the next value is the next two bits, and so on until every four values become one byte (lines 2540 through 2900).

AND the first value with 3 to put it in the 0-3 color range, then multiply by 64 to force it to the left-most two bits; save this in a temporary location. AND the next array value with 3 and multiply it by 16 so it becomes the next two bits; OR this with the temporary value.

The next array color value is multiplied by 4 then OR'd and the fourth value just added. The resulting color byte is stored at the start of graphics. When the end of the graphics page is reached (from locations \$B7/B8), the computation portion is finished and the main program displays the screen — all in just under two seconds.

After you've typed in the program, check for errors with A/N0/NS/WE; save the source code as W EATING2.ASM, then assemble it with A EATING2.BIN /NS/WE. Listing 3 is a BASIC driver that loads the machine language program if necessary and executes it. Save it as EATING3.BAS. Now run it. The screen fills with random color, then slowly begins to converge. With any luck, you will see large chunks of color beginning their stately march across the screen, sweeping up debris as they move along. As more and more blocks collide and merge, they form spirals at various locations that eventually fill the screen. Put on some "Pomp and Circumstances" and enjoy your moving feast.

In the next article we'll get away from graphics and learn how to modify a BASIC program from within the program and use a calculus problem to demonstrate this. Let me know about any suggestions you have for future articles. □

64K Disk



Listing 1: EATING1

```
0 'COPYRIGHT 1990 FALSOFT, INC.
10 X=RND(-TIMER)
20 L=31: DIM N(L,L), NN(L,L)
30 PMODE1,1: PCLS: SCREEN1,1
40 FOR X=0 TO L: FOR Y=0 TO L
50 V=RND(16)-1
60 N(X,Y)=V: NN(X,Y)=V
70 PSET(X+X,Y+Y,V AND 3)
80 NEXT Y,X
90 FOR X=0 TO L: FOR Y=0 TO L
100 V=N(X,Y): V=(V+1) AND 15
```

```
110 IF N(X,(Y-1) AND L)=V THEN NN
(X,Y)=V: GOTO 150
120 IF N((X-1) AND L,Y)=V THEN NN
(X,Y)=V: GOTO 150
130 IF N((X+1) AND L,Y)=V THEN NN
(X,Y)=V: GOTO 150
140 IF N(X,(Y+1) AND L)=V THEN NN
(X,Y)=V
150 NEXT Y,X
160 FOR X=0 TO L: FOR Y=0 TO L
170 V=NN(X,Y): N(X,Y)=V
180 PSET(X+X,Y+Y,V AND 3)
190 NEXT Y,X: GOTO 90
```



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Listing 2: EATING2

```

00100      ORG      $2A00
00110 PAGE    EQU    $9653
00120 PCLS    EQU    $9542
00130 SCREEN  EQU    $95AA
00140 CSET     EQU    $9682
00150 HIGH     EQU    $FFDF
00160 LOW      EQU    $FFDE
00170 DOWN     EQU    $BD
00180 ACROSS   EQU    $BE
00190 VALUE    EQU    $BF
00200 TEMP      EQU    $C0

00205
00210 START    LDY    #$8000
00220          ORCC   #$50
00230          CLRA
00240 ALOOP2    STA    DOWN
00250          CLRB
00260 ALOOP1    STB    ACROSS
00270          ,LDB   #16
00280          JSR    $BC7C
00290          JSR    $BF1F
00300          JSR    $B3ED
00310          DECB
00320          CLR    HIGH
00330          STB    $3000,Y
00340          STB    ,Y+
00350          CLR    LOW
00360          LDU    #COLORS
00370          LDB    B,U
00380          STB    $B5
00390          LDA    DOWN
00400          LDB    $B9
00410          MUL
00420          ADDA   $BA
00430          TFR    D,X
00440          LDB    ACROSS
00450          LSRB
00460          LSRB
00470          ABX
00480          LDA    ACROSS
00490          ANDA   #3
00500          LDU    #TABLE
00510          LDA    A,U
00520          TFR    A,B
00530          COMA
00540          ANDA   ,X
00550          ANDB   $B5
00560          STB    TEMP
00570          ORA    TEMP
00580          STA    ,X
00590          LDB    ACROSS
00600          INCB
00610          CMPB   #127
00620          BLS    ALOOP1
00630          LDA    DOWN
00640          INCA
00650          CMPA   #95
00660          BLS    ALOOP2
00665
00670 PAGE3     LDB    #3
00680          JSR    PAGE
00690          JSR    PCLS
00700          BSR    COMPUT
00710          LDB    #1
00720          JSR    SCREEN
00725
00730 PAGE1     LDB    #1
00740          JSR    PAGE
00750          JSR    PCLS
00760          BSR    COMPUT
00770          LDB    #1
00780          JSR    SCREEN

```

```

00790      BRA      PAGE3
00795
00800 COMPUT    LDU    #$8000
00810          LDX    #$8000
00820          CLR    HIGH
00830 TOPROW     CLR    CLRB
00840 TR1        STB    ACROSS
00850          LDA    ,U
00860          INCA
00870          ANDA   #15
00880          STA    VALUE
00890          LDA    128*95,U
00900          CMPA   VALUE
00910          BNE    TRLEFT
00920          STA    $3000,U
00930          BRA    CONTTR
00940 TRLEFT     LDB    ACROSS
00950          DECB
00960          ANDB   #127
00970          LDA    B,X
00980          CMPA   VALUE
00990          BNE    TRRI
01000          STA    $3000,U
01010          BRA    CONTTR
01020 TRRI      LDB    ACROSS
01030          INCB
01040          ANDB   #127
01050          LDA    B,X
01060          CMPA   VALUE
01070          BNE    TRBOT
01080          STA    $3000,U
01090          BRA    CONTTR
01100 TRBOT     LDA    128,U
01110          CMPA   VALUE
01120          BNE    CONTTR
01130          STA    $3000,U
01140 CONTTR     LEAU   1,U
01150          LDB    ACROSS
01160          INCB
01170          CMPB   #127
01180          LBL    TR1
01185
01190 BOTROW     LDU    #$8000
01200          LEAU   128*95,U
01210          LDX    #$8000
01220          LEAX   128*95,X
01230          CLR    CLRB
01240 BR1        STB    ACROSS
01250          LDA    ,U
01260          INCA
01270          ANDA   #15
01280          STA    VALUE
01290 BRTOP      LDA    -128,U
01300          CMPA   VALUE
01310          BNE    BRLEFT
01320          STA    $3000,U
01330          BRA    CONTBR
01340 BRLEFT     LDB    ACROSS
01350          DECB
01360          ANDB   #127
01370          LDA    B,X
01380          CMPA   VALUE
01390          BNE    BRRI
01400          STA    $3000,U
01410          BRA    CONTBR
01420 BRRI      LDB    ACROSS
01430          INCB
01440          ANDB   #127
01450          LDA    B,X
01460          CMPA   VALUE
01470          BNE    BRBOT
01480          STA    $3000,U
01490          BRA    CONTBR
01500 BRBOT     LDA    -128*95,U

```

```

01510      CMPA      VALUE
01520      BNE        CONTBR
01530      STA        $3000,U
01540 CONTBR        LEAU   1,U
01550      LDB        ACROSS
01560      INCB
01570      CMPB       #127
01580      LBL        BR1
01585
01590 CENTER      LDU    #$8000
01600          LEAU   129,U
01610          LDA    #1
01620 CLOOP2       STA    DOWN
01630          LDB    #1
01640 CLOOP1       STB    ACROSS
01650          LDA    ,U
01660          INCA
01670          ANDA   #15
01680          STA    VALUE
01690 TOP          LDA    -128,U
01700          CMPA   VALUE
01710          BNE    LEFT
01720          STA    $3000,U
01730          BRA    CONT
01740 LEFT         LDA    -1,U
01750          CMPA   VALUE
01760          BNE    RIGHT
01770          STA    $3000,U
01780          BRA    CONT
01790 RIGHT        LDA    1,U
01800          CMPA   VALUE
01810          BNE    BOTTOM
01820          STA    $3000,U
01830          BRA    CONT
01840 BOTTOM        LDA    128,U
01850          CMPA   VALUE
01860          BNE    CONT
01870          STA    $3000,U
01880 CONT         LEAU   1,U
01890          LDB    ACROSS
01900          INCB
01910          CMPB   #126
01920          LBL    CLOOP1
01930          LEAU   2,U
01940          LDA    DOWN
01950          INCA
01960          CMPA   #94
01970          LBL    CLOOP2
01975
01980 COLUMN      LDU    #$8000
01990          LEAU   128,U
02000          LDA    #1
02010 LC1         STA    DOWN
02020          LDA    ,U
02030          INCA
02040          ANDA   #15
02050          STA    VALUE
02060 LCTOP        LDA    -128,U
02070          CMPA   VALUE
02080          BNE    LCLEFT
02090          STA    $3000,U
02100          BRA    CONTLC
02110 LCLEFT      LDA    127,U
02120          CMPA   VALUE
02130          BNE    LCRI
02140          STA    $3000,U
02150          BRA    CONTLC
02160 LCRI        LDA    1,U
02170          CMPA   VALUE
02180          BNE    LCBOT
02190          STA    $3000,U
02200          BRA    CONTLC
02210 LCBOT       LDA    128,U
02220          CMPA   VALUE

```



```

02230      BNE      CONTLC
02240      STA      $3000,U
02245
02250  CONTLC  LEAU      127,U
02260  RICOL   LDA       ,U
02270      INCA
02280      ANDA      #15
02290      STA      VALUE
02300  RCTOP   LDA      -128,U
02310      CMPA
02320      BNE      RCLEFT
02330      STA      $3000,U
02340      BRA      CONTRC
02350  RCLEFT  LDA      -1,U
02360      CMPA      VALUE
02370      BNE      RCRI
02380      STA      $3000,U
02390      BRA      CONTRC
02400  RCRI    LDA      -127,U
02410      CMPA      VALUE
02420      BNE      RCBOT
02430      STA      $3000,U
02440      BRA      CONTRC
02450  RCBOT   LDA      128,U
02460      CMPA      VALUE
02470      BNE      CONTRC
02480      STA      $3000,U
02490  CONTRC  LEAU      1,U
02500      LDA      DOWN
02510      INCA
02520      CMPA      #94
02530      BLS      LC1
02535
02540  SHOW    LDU       $BA
  
```

```

02550      LDX      #$8000
02560  CSHOW   LDA      $3000,X
02570      STA      ,X+
02580      ANDA      #3
02590      LSLA
02600      LSLA
02610      LSLA
02620      LSLA
02630      LSLA
02640      LSLA
02650      STA      TEMP
02660      LDA      $3000,X
02670      STA      ,X+
02680      ANDA      #3
02690      LSLA
02700      LSLA
02710      LSLA
02720      LSLA
02730      ORA      TEMP
02740      STA      TEMP
02750      LDA      $3000,X
02760      STA      ,X+
02770      ANDA      #3
02780      LSLA
02790      LSLA
02800      ORA      TEMP
02810      STA      TEMP
02820      LDA      $3000,X
02830      STA      ,X+
02840      ANDA      #3
02850      ORA      TEMP
02860      STA      ,U+
02870      CMPI    $B7
02880      BLO      CSHOW
  
```

```

02890      CLR      LOW
02900      RTS
02905
02910  TABLE  FDB      $C030
02920      FDB      $0C03
02930  COLORS  FDB      $0055
02940      FDB      $AAFF
02950      FDB      $0055
02960      FDB      $AAFF
02970      FDB      $0055
02980      FDB      $AAFF
02990      FDB      $0055
03000      FDB      $AAFF
03010      END      START
  
```

Listing 3: EATING3

```

0 'COPYRIGHT 1990 FALSOFT, INC.
10 PCLEAR4: CLEAR200,&H2A00-1
20 IF PEEK(&H2A00)<>16 THEN LOAD
M"EATING2":POKE &HFF40,0
30 X=RND(-TIMER)
40 PMODE1,3:PCLS
50 PMODE1,1:PCLS:SCREEN1,1
60 EXEC&H2A00
70 GOT070
  
```



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Programming the PIAs

by Marty Goodman
Contributing Editor

Where can I find information about how to access the PIAs of the CoCo and how to use its interrupts?

Michael Duggan
Ashland, Kentucky

The best references for directly accessing the hardware of the CoCo are included in the Tandy Service Manual for the model of Color Computer in question. This manual can be ordered directly from your local Radio Shack store or via one of a number of RAINBOW advertisers. It contains information on which bits of which bytes in the input/output area of the memory map control particular functions. It also contains a schematic of the Color Computer, an essential aid for dealing with the hardware.

Another excellent reference is the four-book series *BASIC Unravalled*. The first three books are extensively commented disassemblies of Color BASIC, Extended Color BASIC and Disk BASIC for the CoCo 1 and 2. The fourth book has an extensive, commented disassembly of the Extended Color BASIC ROM inside the CoCo 3. There are some chapters on the hardware, but these books' main value is in giving you examples of how Microsoft and Microware addressed the hardware in question. Microcom sells both the *BASIC Unravalled* series and the service manual.

Bill Barden has a new book on how to use the CoCo for simple control applica-

tions, using minimal extra hardware. His book may provide some excellent examples of assembly language programming. Similarly, you may find some of the articles in Tony DiStefano's book *Complete Turn of the Screw* helpful.

Converting the DC Modem Pak

I'm having problems converting my Direct Connect Modem Pak into a general purpose RS-232 pak. I severed the connections between the 6551 chip and the on-board modem chip and sent the relevant lines (DCD, CTS, TXD, RXD, DSR and DTR) through a hex inverter/buffer before sending them to a connector. Yet the pak still does not work with my DC-212 modem using either /T2 or /T3 under OS-9.

George Spears
Pinole, California

Instead of using a hex inverter/buffer, you need to use RS-232 level converter chips. These chips not only invert the signal, but convert from the 0 to 5 volts used by TTL logic to the -12v to +12v levels used in RS-232. The Tandy RS-232 Pak uses 1488 and 1489 chips to do this conversion, but the 1488 requires separate sources of plus and minus 12 volts in addition to the usual +5 volt supply. Alternatively, you can use a MAX232 chip, which is a single chip that has two RS-232 to TTL converters and two TTL to RS-232 converters and can be powered from a single, regulated +5 volt source.

The Direct Connect Modem Pak is addressed at \$FF6C through \$FF6F, and it is the /T3 descriptor under OS-9 that looks for it there. The /T2 descriptor that addresses the RS-232 Pak looks for the cartridge at addresses \$FF68 through \$FF6B. Both the /T2 and /T3 descriptors look for the cartridge to be in Slot 1 of the Multi-Pak, though if you have strapped the interrupt line on the Multi-Pak, the RS-232 Pak or Modem Pak is no longer slot dependent.

Printer Baud Rates

How can I change the baud rate of the printer from 600 to 2400 on the various programs I use?

Ralph McCormic
Keno, Oregon

Changing the baud rate for BASIC programs is easy; just poke the appropriate value into Location (decimal) 150. To set the baud rate to 2400 on a CoCo running at 1MHz, the value is 18 (POKE 150,18). If you are using a CoCo 3 at 2MHz, the constant to use is 41 (POKE 150,41). Most machine language programs for the Color Computer include a means of setting the baud rate as some part of the setup for that program. For those that do not, it may be difficult or impossible to set the baud rate to a value you desire. An example of this is the *Scriptsit* cartridge. Even when *Scriptsit* is transferred to disk, changing the baud rate is difficult because *Scriptsit* uses its own printer port driver that does not go through the code used by BASIC.

Undeleting Disk Files

I've observed that when a file is killed on a disk, the first letter of that file is changed to CHR\$(0) in the directory. Yet, when I use a simple BASIC program to restore the letter to what it was after I killed a file, I still get an error message when trying to access that file. Please explain why this is so.

John Musumeci
Ozone Park, New York

When you kill a file, not only is the first letter wiped out in the listing of directory names in Track 17, Sector 3 of the disk, but more importantly, all of the granules assigned to that file in the file allocation table in the first 64 bytes of Sector 2 of Track 17 are reset to \$FF.

To restore a killed file, you must not only restore the directory entry, but restore

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

the entries in the file allocation table allocating the granule(s) that were part of that file. All this must be done *before* any new files are written to that disk, or else the granules that contained the information of that file might get written over, and all the data will then be truly lost. I strongly recommend a careful study of Chapter 11 of the Disk Extended Color BASIC manual that comes with Tandy disk drives. This manual can also be ordered from Tandy via any Radio Shack store. In it is an excellent detailed description of the way file entries are made in the directory and file allocation table. More information can also be found in Bill Daniel's article, "Back From the Dead," in the June 1990 issue (Page 26).

Blown Multi-Pak

I accidentally shorted some contacts on my Multi-Pak (pins 1 and 2 of Slot 4, I believe), and now U15 (a 7912CT transistor) smokes whenever I turn the Multi-Pak on. I also need a source for a forty-pin edge

connector, PC board mount of the sort used in the Multi-Pak. I broke a pin on one of mine. The Multi-Pak in question is an older, gray-case Multi-Pak (26-3024).

Kerry Moline
Denver

The 7912 is not a transistor, but a monolithic, negative 12-volt power regulator. The part is available at most electronic supply houses and Radio Shack stores. The 40-pin connector you seek is listed as manufacturer's part number 194210110A or 194210120A in the service manual for the current Multi-Pak. You can order it from National Parts via your local Radio Shack store. Just specify that part number and give the catalog number of the Multi-Pak.

You might want to say you have a 26-3124 Multi-Pak; the connector in question is the same. You should also order the service manual for the 26-3024 Multi-Pak, so you can properly test and fix the power supply.

You could have a bad 7912, but you may

have some other problem in the supply that is cooking the 7912. It seems possible that you might have a blown bridge rectifier (CR2—a little square item with four leads). You might want to look for this.

Missing Parts

Can I convert a Magnavox 8CM652 monitor so that it can be properly used with the CoCo 3? This monitor is similar to the Magnavox 8CM515 but lacks an analog RGB input.

Dennis McMillian (COCOKIW1)
Pittsburgh, California

It seems that the Magnavox 8CM652 (and its successor, the Magnavox 8CM762) uses the same main circuit board as does the Magnavox 8CM515. You *can* add analog input to a Magnavox 8CM762 monitor, and I have actually made such a conversion. The process is tedious and involves cleaning over 100 solder holes and adding over fifty "missing" components to the printed

One-Liner Contest Winner . . .

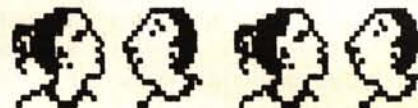
This program factors any given number. All you have to do is enter a number. Remember, if a number has only one and itself as factors, it is a prime number.

The Listing:

```
1 CLS:INPUT"ENTER NUMBER ";N:FOR
X=1TOSQR(N):A=N/X:B=INT(A):IFA=B
THENPRINTX;"X";A:NEXTX:PRINT"PR
ESS A KEY":EXEC44539:GOTO1:ELSE
NEXTX:PRINT"PRESS A KEY":EXEC445
39:GOTO1
```

Hinh Phansavath
Buena Park, California

For this winning one-liner contest entry, the author has been sent copies of *The Fourth Rainbow Book of Adventures* and the accompanying disk.



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circuit board. The bright side of this is that the components are all very inexpensive — I paid under \$10 for all of them.

Those interested in making such a conversion should obtain a service manual for the Magnavox 8CM515/8CM652 series of monitors, compare the schematics and printed circuit board layout for the 8CM515 to that of the 8CM652, and add the needed components. (You do need to be a reasonably competent hardware tinkerer to do this sort of thing.) If you write me in care of THE RAINBOW, I may be able to provide more specific information.

Sega Sync

Several people on Delphi have asked me about using Color Computer type monitors with their Sega Genesis system. There is an 8-pin DIN connector on the Sega Genesis system for both RGB and composite video output. The pinouts are as follows:

Pin	Function
1	audio
2	ground
3	video
4	+5
5	Green
6	Red
7	composite H&V sync
8	Blue

Unfortunately, the 8-pin connector used by Sega has an unusual pin spacing, and the ordinary 8-pin male DIN connectors sold by many electronic supply houses will not fit. Hackers may want to open the unit and install their own connector. I recommend a DB9 or other similar connector.

It should be easy to use a Magnavox 8CM515 monitor with the Sega, because the Magnavox accepts any kind of sync signal (separate or composite, positive or negative). If you are trying to use a CM-8 or Atari monitor, you not only have to contend with odd connectors, but you have to devise a suitable sync separator circuit to convert the combined sync from the Sega Genesis into a separate sync the monitor can use. If you are using a composite video monitor, a standard 5-pin DIN plug is all you need. Just take the line level audio off Pin 1, ground from Pin 2 and composite video from Pin 3 of the 5-pin male DIN plug and plug it right into the 8-pin female socket on the Genesis.

Steve Bjork (6809ER)
Los Angeles

Thanks Steve. I've talked to a chap on Delphi who, using your information and some sync separator circuits I sent him, managed to get his Sega Genesis working with his CM-8. He says the CM-8 image is

outstandingly sharp — significantly superior to the image he got using either RF or composite video. Tinkerers who have some experience fooling with minor circuit design changes may want to write to me for copies of those suggested sync conversion circuits.

The CoCo/Model III Connection

I have an FD-502 disk drive system and an old 16K TRS-80 Model III that has no drives. Can I connect the FD-502 to the system bus slot on the Model III so I can use it with that computer?

Tika Carr
Rochester, New York

No. The system bus of the Color Computer and that of the Model III are too different. Read/Write, control and master-clock pulses are different between the 6809 and the Z80, as are the means of addressing input/output ports. You probably do not have the ROM firmware needed to boot the operating system for the TRS-80 Model III. You can use the physical drive of the FD-502 with the Model III, but you first need to get a Model III style disk controller and would likely want to upgrade the memory of the Model III too. It is not worth the time and expense to do this.

Extra Pins on SmartWatch

I've found it fairly simple to add a SmartWatch to CoCo disk controllers that have only a 24-pin socket. You must jumper Pin 26 of the SmartWatch to Pin 28, then plug it into the 24-pin socket with pins 1, 2, 27 and 28 of the SmartWatch overhanging the top of the 24-pin ROM socket. Apparently pins 1, 2 and 27 are not used on the SmartWatch, and the jumper from Pin 26 to 28 supplies power to the chip. When putting in the jumper, note that Pin 26 must still be able to be inserted into the 24-pin socket.

Roger Krupski
Rochester, New York

Locating Hard-Disk Controllers

Where can I find the disk controllers you mentioned in your article on hard drives? Many no longer seem to be offered in the catalogs I have. Also, what RGB monitors do you recommend in the under-\$400 price range?

Guy B. Meredith (GMEREDITH)
Costa Mesa, California

The Western Digital 8-bit hard drive controller (WX2A) can still be found at many local area computer swap meets. They are often sold for under \$30. SCSI hard drive boards are a bit harder to find. Get a copy of *Nuts and Volts* (often given away at such flea markets) and check the ads of various surplus dealers. There are a number

of such in the San Jose and Santa Clara area, which from time to time advertise SCSI controller boards of various sorts.

As far as monitors are concerned, the Magnavox 1CM135 (the replacement for the Magnavox 8CM515, which has been discontinued) remains the most economical high-quality monitor for the CoCo 3, Amiga or Atari ST. If you plan on moving up to one of the OS9/68000 engines (such as the Frank Hogg Tomcat or the Kenneth Leigh MM/1), shop around for a low-end, Multisync-type monitor. Multisync monitors with a dot pitch of .31mm and which support only up to 640-by-480 displays are sometimes available at computer swap meets, often for under \$400. Such a monitor works well with the CoCo 3 and is usable with either one of the new OS9/68000 engines or with a PC clone in some of the VGA modes. Be sure not to get a VGA-only monitor, as it would be useless with a CoCo 3 and newer OS-9 engines.

Such VGA-only monitors are usually called VGA monitors, as opposed to Multisync (also called Multiscan, Varisync and other copyrighted trade name variants) type monitors.

Plug 'n Power — Plug 'n Go

How can I use the Plug 'n Power unit with the CoCo 3?

Timothy P. Kovalcik (TIMK)
Phoenix

The ROM pack that provides the software controller for the Plug 'n Power unit is the problem. It uses a graphics mode not supported by the CoCo 3's GIME chip. I've heard rumors that Bill Barden may provide software that runs on the CoCo 3 and works with the Plug 'n Power hardware. Keep your eyes open for it in THE RAINBOW.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.

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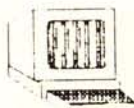
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When the program starts, the computer draws a random maze, makes an exit in the lower right-hand corner, and places you in the upper left-hand corner of the maze. The object is to get to the exit in the least amount of time, using the right joystick. You can only move diagonally.

The Listing:

```
0 POKE&HFFD9,0:PMODE0,1:PCLS:SCR
EEN1,1:FORX=20TO220STEP10:FORY=2
0TO160STEP10:DRAW"BM"+STR$(X)+",
"+STR$(Y)+MID$("DULR",RND(4),1)+
"10":NEXTY,X:DRAW"BM10,10D160R21
0BR10U160L218":X=12:Y=12:TIMER=0
1 FORI=1TO2000:PSET(X,Y,1):DX=2*
SGN(JOYSTK(0)-32):DY=2*SGN(JOYST
K(1)-32):IFPOINT(X+DX,Y+DY)=0TH
ENPRESET(X,Y):X=X+DX:Y=Y+DY:IFY>
170THENCLS:PRINT@200,"TIME=";TIM
ER:ENDELSENEXTI:CLS:PRINT@200,"T
OO MUCH TIME!":ENDELSENEXTI:CLS:
PRINT@200,"TOO MUCH TIME!"
```

*Francois Dubuc
Quebec*

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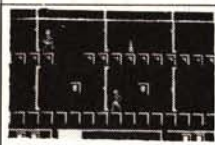
```
10 CLS(0):LINE INPUT "TITLE:";W$
:L=LEN(W$):IFL>30 THEN 10 ELSE C
LS(0)
20 FORP=191TO160STEP-1:L$=LEFT$(
W$,W):PRINT@P,L$:FORY=1TO100:NEX
TY:W=W+1:NEXTP:FORWW=1TOL+1:M$=M
ID$(W$,WW,L):PP=160:PRINT@PP,M$:
FORY=1TO100:NEXTY:NEXTWW:W=0:GOT
O20
```

*Elizabeth Ligon
Miami*

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Reviewed July '90

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Reviews August '88, July '89, September '89

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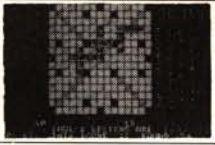
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NEW!!!

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Color Ball

by Jay Braxmaier

This is a Lo-Res graphics game that lets you play pinball with a paddle instead of flippers. Line 480 lets you get different points for different color bumpers. Because of the way the Set/Reset graphics work, you see some interesting things happen to the bumpers and side walls.

Lines 170, 180 and 190 contain the data for setting up the bumpers. You can make this anything you want. I have increased the speed of the game with POKE 65945, 0 and by adding lines to jump over other lines — for instance, the program reprints the paddle if it hasn't been moved.

Once you understand the way the program operates it should be easy to convert it to a Hi-Res screen.

The Listing: COLRBALL

```

(0) ' COPYRIGHT 1990  FALSOFT, INC
(10) '*****
(20) '**COLOR BALL**
(30) '**      BY      **
(40) '**JAY BRAXMAIER**
(50) '**(616)453-1011**
(60) '*****
(70) CLS
(80) POKE65495,0
(90) FOR J=10 TO 54:SET(J,3,4):NEXT J
(100) FOR J=3 TO 28:SET(10,J,4):NEXT J
(110) FOR J=3 TO 20:SET(54,J,4):NEXT J
(120) FOR J=20 TO 28:SET(11,J,4):NEXT J
(130) FOR J=22 TO 28:SET(13,J,4):NEXT J
(140) FOR J=1 TO 6:SET(13+J,22+J,4):NEXT J
(150) FOR J=1 TO 9:SET(54-J,19+J,4):NEXT J
(160) FOR J=1 TO 48:READA,B,C:SET(A,B,C):NEXT J
(170) DATA 26,4,3,27,4,8,29,4,2,30,4,7,35,4,1,36,4,6,38,4,3,39,4,4,15,6,1,14,7,2,15,8,3,16,7,5,23,9,6,26,9,7,29,9,8,32,9,1,35,9,2,38,9,3,42,9,5
(180) DATA 48,6,6,47,7,7,49,7,8,48,8,1,11,10,2,11,11,3,11,12,5,11,13,6,53,10,7,53,11,8,53,12,1,53,13,2,20,16,3,20,17,5,21,17,6
(190) DATA 32,15,7,31,16,8,33,16,1,32,17,2,44,16,3,44,17,5,43,17,6,19,21,7,21,23,8,25,23,4,32,23,4,39,23,4,43,23,1,45,21,2
(200) FOR J=1 TO 5:SET(13+J,23+J,4):NEXT J
(210) FOR J=1 TO 8:SET(53-J,19+J,4):NEXT J
(220) PRINT@5,"SCORE:";
(230) E$=CHR$(227)+CHR$(227):F$=CHR$(128)+CHR$(128):PD=23:DP=23:BA=5:SC=0:BX=12:BY=28:SX=0:SY=-1:Z=5
(240) PD=INT(JOYSTK(0)/2)
(250) IF PD>19 THEN PD=19
(260) IF PD<11 THEN PD=11
(270) IF DP=PD THEN 310
(280) PRINT@448+DP,F$;
(290) PRINT@448+PD,E$;
(300) DP=PD
(310) IF BY=4 THEN GOTO 460
(320) IF BX=11 OR BX=53 THEN SX=-SX
(330) IF BY<>29 THEN 380
(340) SOUND 100,8:RESET(BX,BY):BX=12:BY=28:SC=0:SY=-1:BA=BA-1:Z=RN D(5):RESET(12,21)
(350) IF BA<>0 THEN 440
(360) IF BA=0 THEN IF INKEY$<>" " THEN RUN
(370) GOTO 360
(380) RESET(BX,BY):BX=BX+SC:BY=BY+SY
(390) IF BX>53 THEN BX=53
(400) IF BX<11 THEN BX=11
(410) IF BX=12 AND BY=20 THEN SET(12,21,4)
(420) IF SX=0 AND POINT(BX,BY+SY)<>0 THEN X=POINT(BX,BY+SY):GOTO 460
(430) IF SX<>0 AND POINT(BX+SC,BY+SY)<>0 THEN X=POINT(BX+SC,BY+SY):GOTO 460
(440) SET(BX,BY,Z)
(450) GOTO 240
(460) SOUND 100+(RND(10)*5),1:SY=SY-BY+BY+SY:A=RND(3):IF A=1 THEN SX=-1 ELSE IF A=2 THEN SX=1 ELSE SX=0
(470) SET(BX,BY,Z)
(480) IF X=4 THEN 240 ELSE IF X=3 THEN SC=SC+10 ELSE SC=SC+1
(490) PRINT@11,SC;:GOTO 240

```

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Build up an object from available 3D primitives or copy and edit an old group of objects. Pico can assemble these objects, or pieces, into one new object; by doing this over and over again complex objects can be viewed, scaled, moved, or rotated in a single action. A library of house and furniture objects is included for fun!

Presently, Pico can only output "merge" format drawing files (viewed with the included "mvdg") or plot on the Tandy PC-695 Plotter in the DM-PL plotting language (driver source code available).

"VOLL.: I+IS aB0ut iMe x! hAin't?"

* THE PICO SYSTEM IS \$36, PC-695 Plotter Driver \$6 (Write for Source Code)
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* Also Included: Snappy Icons for above ALFs, Manual, and Applications
* Also Included: Sample Object Library, Pico Setup, and Sample Drawings
Mvdg is available separately for \$7 (See August 1990).

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Warming up to
spreadsheets

Spread a Sheet for Heat Loss

by Francis M. Walters

I took a long time getting acquainted with computer spreadsheets because I thought they were just a tool for accountants and money managers. The surprise is that computer spreadsheets also have non-accounting uses. And the great thing is that they do all the calculations and much of the work of setting up the calculations.

A spreadsheet is basically a sheet of paper ruled into columns and rows. Accountants fill them up with numbers that might represent expenses and receipts. Managers use them to break down jobs into smaller tasks so as to estimate time and cost to do a job. Spreadsheets can be used for making a personal budget or — as described here — for insulating a house.

The BTU-loss spreadsheet presented here was created using *DynaCalc* on a CoCo 3 with OS-9 Level II and 512K. Other spreadsheet programs should work as well, although you may have to change the format of some formulas. The significant technique I present is the application of heat flow calculation, which may be new to computer users. Once you understand the idea and include all the surfaces separating inside from outside, you can expand the spreadsheet to houses with more rooms and/or floors.

A computer spreadsheet does better in several respects than a pencil-and-paper spreadsheet. For instance, the computer allows you to select the column widths with narrow columns for some items and wide columns for text labels. Extra blank rows or

columns can be inserted if you find you missed something. Or if you would like to rearrange the page, whole rows or columns can be interchanged, taking all the numbers along to the new location. Each block, or cell, can have a label, a number value or an associated instruction of how to evaluate the number value for that cell using information in other cells. Instructions are kept in a phantom page you don't see, but the instructions can be examined one cell at a time. I call the instruction page a *phantom* because in *DynaCalc* you never see it, and the manual does not name it. Veteran computer spreadsheet users may refer to my phantom page as a *template*.

As you fill in the data cells, the instructions go to work and fill in the associated cell on the displayed data page. While you can see all the spreadsheet data your computer screen allows, only the instruction at the cursor location is brought out to a special location on the screen. The spreadsheet can be much larger than the 80-by-24 screen size. In fact, you can move the screen window around the spreadsheet. Column and row headings are kept on the screen border as you move the viewing window around a larger spreadsheet.

You can instruct the computer to add the numbers in a column or to multiply numbers in Column B by Column C for each row and put the result in Column H. It might seem like a lot of drudgery to fill in all those instructions, but where similar things are to be done, you can call up a Replicate function that will copy the function into another cell or block, either relatively or exactly. More on this later. Labels can also be copied, plus there's a wide variety of available math and logic functions. It is easy to erase, write over or edit a number, label or instruction.

Now let's use a spreadsheet to see what various home insulation improvements can

Fran Walters has taught high school physics and is now a retired electronics engineer. He leads a Swiss folk dance group, plays analog accordeon, digital piano, keeps bees and does volunteer work with Quest for Peace. He may be contacted at 5704 Kingswood Road, Bethesda, MA 20814.

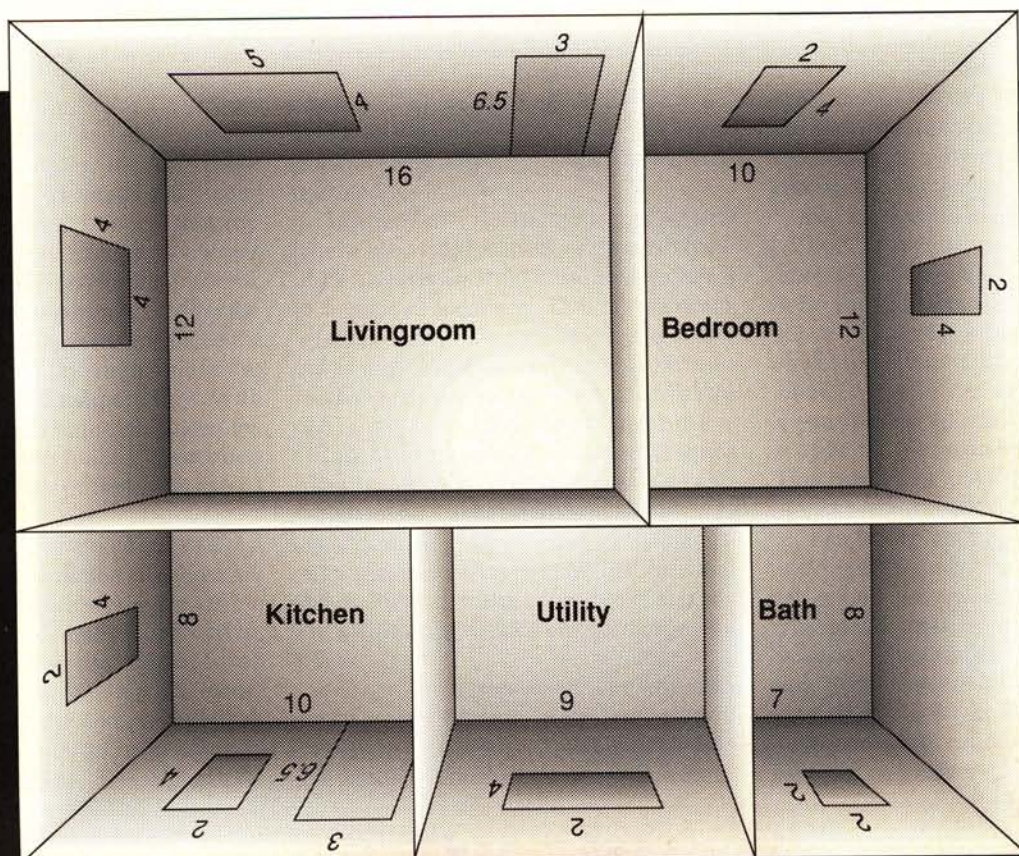


Figure 1

do. You've heard about the R value and know that the bigger it is, the less the amount of heat that goes through the insulation. More specifically, the temperature difference (degrees Fahrenheit) between inside and outside divided by the total R value gives the number of BTU per hour that is lost through a square foot of material. I said total R value because you generally have several layers; an outside wall has maybe four inches of brick, $\frac{3}{4}$ inch of wood or fiber, three inches of fiberglass and one-half an inch of wallboard, so you add the separate R values. A ceiling would have just the wallboard and then the fiberglass.

Suppose you would like an additional six inches of insulation in the attic. It's easy with a computer spreadsheet. My single-floor house sits on a concrete slab, so I add the R value of carpets to the R value for three inches of concrete and $\frac{1}{8}$ inch of asphalt tile. You can find tables of R values for building materials in various books. The R value for insulation is often printed on the roll; you'll just have to measure temperature.

Setting Up the Spreadsheet

Figure 2 shows the spreadsheet arrangement I used for the sample house plan of Figure 1. Data columns are at the left on Figure 2; the derived columns are at the right. Locations marked with -- indicate cells in which you must enter data once the phantom page is ready. *DynaCalc* does not replicate simple instructions like *Fn*, which just repeat a number value. These must each be typed in where needed.

The rows are numbered; the columns are lettered. Each room is considered separately. I listed windows and doors before walls because a correction (subtracting window and door areas) must be made to the wall area. Spreadsheet programs work down and across the page in a particular order, so have the information available before it is needed. The table implies that the rooms have two exposed walls at most. If there are two outside walls, I enter both width and length. The computation adds length and width to get total outside exposed wall. For the utility room with one outside wall I enter only width.

I save time entering data by entering room height just once at Cell B7 and use B7 as the instruction wherever room height is needed. The computer copies the data from Cell B7 into every other cell where B7 is the instruction. In each room the floors and ceilings are the same size, so enter those numbers just once (unless you have cathedral ceilings). Outdoor temperature is probably the same for all outside walls, doors and windows. It can be entered once at G5 and copied by the computer where needed. So I write G5 into cells G6, G7, G12, G13, G14, etc. That allows me to change the outdoor temperature with just one entry. I've made floor and ceiling temperatures different from the walls, because they are different (unless you run a ceiling fan).

I do each room separately so I can shut off a room to save heat. Consequently Column F allows different temperatures for each room. Windows and doors have different R values than the wall, and the heat loss is different; therefore I subtract the door and window areas from the wall area. This leaves the portion that uses the R

A	B	C	D	E	F	G	H	I	J
ITEM	height ft	width ft	length ft	R	t(in) deg F	t(out) deg F	area sqft	loss BTU/hr	total BTU/hr
1									
2									
3									
4	Living Room								@SUM(I5...I9)
5	windows	--	--	--	--	--	(B5*C5)	(F5-G5)*H5/E5	
6	door	--	--	--	(F5)	(G5)	(B6*C6)	(F6-G6)*H6/E6	
7	wall	--	--	--	(F5)	(G5)	((B7*(C7+D7))-H5-H6)	(F7-G7)*H7/E7	
8	ceiling	--	--	--	(F5+3.5)	--	(D8*C8)	(F8-G8)*H8/E8	
9	floor	(C8)	(D8)	--	(F5-3.5)	--	(D9*C9)	(F9-G9)*H9/E9	
10									@SUM(I12...I16)
11	Kitchen								
12	window	--	--	--	--	(G5)	(B12*C12)	(F12-G12)*H12/E12	
13	door	--	--	--	(F12)	(G5)	(B13*C13)	(F13-G13)*H13/E13	
14	wall	(B7)	--	--	(F12)	(G5)	((B14*(C14+D14))-H12-H13)	(F14-G14)*H14/E14	
15	ceiling	(C14)	(D14)	(E8)	(F12+3.5)	(G8)	(D15*C15)	(F15-G15)*H15/E15	
16	floor	(C15)	(D15)	--	(F12-3.5)	(G9)	(D16*C16)	(F16-G16)*H16/E16	
17									@SUM(I19...I22)
18	Bedroom-1								
19	windows	--	--	--	--	(G5)	(B19*C19)	(F19-G19)*H19/E19	
20	wall	(B7)	--	--	(F19)	(G5)	((B20*(C20+D20))-H19)	(F20-G20)*H20/E20	
21	ceiling	(C20)	(D20)	(E8)	(F19+3.5)	(G8)	(D21*C21)	(F21-G21)*H21/E21	
22	floor	(C21)	(D21)	--	(F19-3.5)	(G9)	(D22*C22)	(F22-G22)*H22/E22	
23									@SUM(I25...I28)
24	Bath								
25	windows	--	--	--	--	(G5)	(B25*C25)	(F25-G25)*H25/E25	
26	wall	(B7)	--	--	(F25)	(G5)	((B26*(C26+D26))-H25)	(F26-G26)*H26/E26	
27	ceiling	(C26)	(D26)	(E8)	(F25+3.5)	(G8)	(D27*C27)	(F27-G27)*H27/E27	
28	floor	(C27)	(D27)	--	(F25-3.5)	(G9)	(D28*C28)	(F28-G28)*H28/E28	
29									@SUM(I31...I34)
30	Utility								
31	window	--	--	--	--	(G5)	(B31*C31)	(F31-G31)*H31/E31	
32	wall	(B7)	--	--	(F31)	(G5)	((B32*(C32+D32))-H31)	(F32-G32)*H32/E32	
33	ceiling	(C32)	(D32)	(E8)	(F31+3.5)	(G8)	(D33*C33)	(F33-G33)*H33/E33	
34	floor	(C33)	(D33)	--	(F31-3.5)	(G9)	(D34*C34)	(F34-G34)*H34/E34	
35									@SUM(J4...J30)
36	TOTAL HOUSE HEAT LOSS								BTU/hr
37									

Notes: The -- indicates cells where data is required. Parenthesis show instructions that are on the phantom page. They also force DynaCalc to consider the cell references as formulas. Column I was replicated from the formula contained in Cell I5. Column H was replicated from the formulas in the range H5...H9, followed by some deletions. Actual spreadsheet columns need only be wide enough for the column headings and generated data.

Figure 2: BTU Loss Spreadsheet

for the wall. Window heat loss uses the area of the window and the window R value. This is important because more heat may go through the window than the entire wall.

Temperature in the attic over the ceiling first appears in Cell G8, so I tell the spreadsheet to copy it into cells G15, G21, etc. Inside temperatures for walls, windows and doors in each room need to be entered separately for each room, because some rooms are shut off, not heated or are naturally warmer or cooler. I found that my ceiling temperature was 3.5 degrees warmer and the floor 3.5 degrees cooler than the middle level room temperature, so I let the computer and spreadsheet handle those for me in Column F. You might prefer to actually measure those temperatures. With *DynaCalc*, entering a value displaces the previous value or the hidden instruction (and not just the result of that instruction) for that cell.

Figure 2 shows how the values of area, heat loss and the summation of losses are computed. In some instances every cell in a column needs a calculation instruction, but a similar instruction can be used for all rows in that column (the replication feature allows me to instruct the computer spreadsheet to make the subscripts relative to what row they are in). The calculation

appears on the spreadsheet when there is information for making the calculation or whenever you change the information.

The instruction for window area, $Bn * Cn$, goes in Cell Hn. With the cursor at H5 enter the instruction using 5 instead of n ($B5 * C5$). Figure 2 shows which cells can be replicated and where. The instruction associated with the cursor location on the screen shows on the screen in a special location reserved for it.

The replicate function takes a formula from a specified location, or group of locations, and repeats it either to one location or to a range of locations. That allows doing selected spots here and there or a whole column at one time. When you give the replicate command, the instruction for the cell at the spreadsheet cursor is shown at the special location with a cursor pointing in turn at each subscript. The computer asks whether you want a relative subscript or the same one. A relative subscript makes the subscript correspond to the line in which the replicated instruction goes. Use the same subscript to put a constant in several places.

To get the correct wall area you must make a modification to the wall area instructions at rows 7, 14, 20, 26 and 32 to allow for windows and doors in the wall. I like to

let the replicate function do most of the work and then edit the cell to make the slight change needed. In this case the correction was subtracting the window (and door) area calculated in the previous line(s).

After replicating the instruction down the column, you should blank out the instructions in the dead cells of blank lines and opposite room name labels. Otherwise you could get a divide-by-zero fault when you start using the spreadsheet.

The instruction in Cell In, $(Fn - Gn) * Hn / En$, computes heat loss. It represents temperature difference times area divided by R. So the instruction at Location I5 is $(F5 - G5) * H5 / E5$, and it is replicated all the way down the column using the relative option. After typing in the instruction at I5, the keystrokes /R I5 <CR> I6 . I34 <CR> R R R R do all the remainder of the column! Then you blank out the few locations that aren't needed.

The last column provides subtotal heat loss for each room. The living room subtotal in Cell J4 is given by @SUM(I5...I9). The grand total by @SUM(J4...J32) appears at the bottom of the sheet. (*DynaCalc* uses @ to indicate a function.) The actual spreadsheet column widths need only be wide enough to accommodate the column heading or numbers that result.

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Using the Heat Loss Spreadsheet

Until you enter data, the computer screen is blank except for column headings and row labels. A 0 appears in cells with formulas unless the computation involves a division by zero. Until you fill in R values it looks like you have trouble in Column I, but after entering proper values the error condition clears. Some results may look negative until all the values are entered.

Figure 4 shows the spreadsheet after all the data has been entered. That's not really a nine-foot window in the living room, but the sum width of several windows. The R value for single-pane glazing is 0.9. Carpet adds about 2 to the R for the floor. If there is an attic above the ceiling, then the outside temperature for the ceiling is not the same as for an outside wall. (My attic is relatively warm, because the rafters are insulated.)

Temperature over the ceiling inside the attic was measured by putting a thermometer up there. Temperature under the concrete slab floor was estimated by putting the thermometer on the floor inside a closed room with the heat shut off and covering the thermometer with a large fat pillow and waiting until the reading stabilized. The idea is that the pillow keeps room heat from getting to the thermometer and area of concrete floor under it. The floor inside temperature under the pillow eventually

equals the floor underside temperature as the heat flows to the cold dirt under the concrete. That's because concrete is such a poor insulator.

The kitchen window has a thermal shutter of $R=5.8$. If I want to know what good it does to shut off the rooms I'm not using, I can't just omit listing them, because heat still escapes through the walls and windows. Even if I shut off the heat to the room, heat goes through interior walls that are not as well-insulated as outside walls. The closed room's inside temperature is different from the heated rooms. So what I do is shut the door and measure the room temperature after it stabilizes.

One of Radio Shack's digital thermometers with a remote sensor is good for this work. It's good for measuring ceiling and floor temperatures that are different from room temperature. Because of calibration error between different thermometers, the same thermometer should be used for each measurement. But if you use two thermometers, you should provide a correction between them by comparing the readings of the two thermometers measuring at the same place. Even though it reads tenths of degrees on a digital readout, this digital thermometer may have a Degree Zero Error when compared to another thermometer. When using a single thermometer the Zero Error doesn't cause trouble, because

the calculation uses temperature differences.

As you examine the sample printout in Figure 3, you see how much heat goes out the kitchen and bathroom floors without rugs. (Wood floors are much better than concrete!) I show an insulated shutter on the kitchen window ($R=5.8$), which doesn't do a lot of good with all that heat leaking out the floor. It looks like I should put a fat carpet in the bathroom and kitchen and then try thermal shutters on the living room windows for nighttime. The utility room ought to have an insulated wooden floor. There's already enough attic insulation until other losses are corrected.

This spreadsheet calculation only tells how much heat goes through the walls, windows, doors, ceilings, floors — for the temperatures that you specify. If you have air leaks around doors, windows and electrical receptacles, better fix them because they can easily nullify good insulation elsewhere. We don't have a way to calculate draft losses, because the amount of air entering is unknown; it's best to eliminate the air leaks. (Heathkit NE2112 Heat Sniffer kit uses a probe with a thermistor bead to sense drafts.) Unfortunately, the spreadsheet can't tell how long it takes to heat the house, because part of the heat input goes to heating the air, water vapor, walls, ceiling and contents of the house. And more heat escapes up the chimney. But you do know that the less heat lost through walls and windows to the outside, the better off you (and your pocketbook) are.

Once the spreadsheet is set up you can change insulation, add double glazing to the windows, add insulating shutters over windows and put up storm doors and new wall-to-wall carpet, with and without pad — all free; just change the R values. Want to know what setting back the thermostat at night does for you? Change the indoor temperatures on the spreadsheet! It couldn't be easier or cheaper. A good book for helping you warm up your home is *The Super Insulated Retrofit Book* by Brian Marshall and Robert Argue. (Renewable Energy in Canada, 107 Amelia St., Toronto, M4X 1E5 Canada; Fran Walters, 5704 Kingswood Road, Bethesda, MD 20814; 301-530-5643)

As you can well imagine, calculating heat loss is only one application for spreadsheet programs. You can use spreadsheets for just about anything from balancing checkbooks or handling a paper route to calculating component parameters for complex electronic circuits. The example shown here actually uses very little of the power provided in most spreadsheet programs. Just think what problems you could solve with a little imagination and fore-

[1-ITEM	[2- height	[3- width	[4- length	[5- R	[6- t(in)	[7- t(out)	[8- area	[9- loss	[10- loss
	ft	ft	ft		deg F	deg F	sqft	BTU/hr	BTU/hr
4-Living room									3534
5- windows	4	9		.9	68	32	36	1440	
6- door	6.5	3		3	68	32	20	234	
7- wall	8	15	12	13	68	32	161	444	
8- ceiling		15	12	20	71.5	37	180	311	
9- floor		15	12	2.2	64.5	51	180	1105	
11-Kitchen									4907
12- window	4	4		5.8	65	32	16	91	
13- door	6.5	3		3	65	32	20	215	
14- wall	4	10	8	13	65	32	109	275	
15- ceiling		10	8	20	68.5	37	80	126	
16- floor		10	8	.2	61.5	51	80	4200	
18-Bedroom-1									1755
19- windows	4	4		.9	65	32	16	587	
20- wall	8	12	10	13	65	32	160	406	
21- ceiling		12	10	20	68.5	37	120	189	
22- floor		12	10	2.2	61.5	51	120	573	
24-Bath									4062
25- window	2	2		.9	67	32	4	156	
26- wall	8	7	8	13	67	32	116	312	
27- ceiling		7	8	20	70.5	37	56	94	
28- floor		7	8	.2	63.5	51	56	3500	
30-Utility									6236
31- window	2	4		.9	70	32	8	338	
32- wall	8	9		13	70	32	64	187	
33- ceiling		9	8	20	73.5	37	72	131	
34- floor		9	8	.2	66.5	51	72	5580	
36-TOTAL HOUSE HEAT LOSS									20493
									BTU/hr

Figure 3: BTU Loss Results for Sample House

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EPROM Programmer,

Part II

by Tony DiStefano
Contributing Editor

Last month I gave you the schematic and parts list for an EPROM programmer. By now, you probably have the board together and are ready to test it. This is a substantial project and care must be taken to ensure that you do not burn out the EPROMs when you try them out. Therefore we will go through a battery of tests to make sure everything is working as it should.

As always, the first test is a visual check. To wire up something, using the same method as I use, check off every wire you do on the schematic and check to make sure all wires are soldered. To visually check the board, look at each chip one by one. First check for shorts, then check for cold solder joints. Also make sure there is a wire for each pin on the socket. If there are wires missing, check the schematic to make sure there is not supposed to be one there.

Before you plug in all the chips, check for the basics. Did you connect the power and ground lines? The easiest way to check if all chips will be powered is to use an ohm meter with a continuity option. I recommend getting one if you don't already have one. Besides, you will need a voltmeter later anyway. Before continuing with the continuity and resistance checks, make sure no power is applied to the circuit! Put one side of the checker to the positive voltage pin of the connector. With the other end of the probe, check every socket that is supposed to have positive voltage. Do the same with all the ground connections.

The next test is simple; check the resis-

tance between +5 volts and ground. It should show a somewhat low resistance at first, but then the resistance should rise. This is because it takes a certain voltage in order to measure ohms. Different meter companies use different voltages, but all have some. And if you remember Ohm's law; $R = V/I$, you see how its done. If you place a known voltage across a resistor, the current has a direct relation with the resistance. So measure current with a known voltage and you have resistance. The point I'm trying to make here is that as soon as you put your ohmmeter to the circuit, voltage is introduced into the circuit.

There are a lot of capacitors on your board. What happens when you introduce a voltage across a capacitor? The capacitors start to charge; at first, the resistance is low

and slowly starts to climb. This is normal, and if you do not get this, check your circuit again. There should not be a short between +5 volts and ground.

Okay, enough for the visuals, plug in all the chips and make sure none are in backwards. Check for Pin 1 polarity. Before you plug the circuit into your controller or CoCo, check the power regulator. Plug in the power adapter into JP1. With the help of Figure 1 of the first part of this project, measure the voltage at Pin 3 of the LM317. It should be somewhere between 25 and 39 volts — if it's too low, you won't be able to program EPROMs that require 21.5 volts. If the voltage is too high, you may burn out the regulator.

Now, with the jumper on JP2 set to 1 and 2, measure the voltage on the output of the

Address	Function
\$FF50	Read/Write EPROM DATA 8 - Bits
\$FF51	Write Only Control Byte D0 = A12 D1 = A13 D2 = *OE Active Low D3 = *PGM Active Low D4 = *CE Active Low D5 = V_{pp} (0=Off, 1=On) D6 = V_{cc} (0=Off, 1=On) D7 = Write Data Enable (1=Write, 0=Hi-Z)
\$FF52	Write Only Address Stepper A write to this location increments A0 to A11.
\$FF53	Write Only Address Reset A write to this location resets A0 to A11 to Low.

Table 1: Memory Map

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's user-name on Delphi is DISTO.

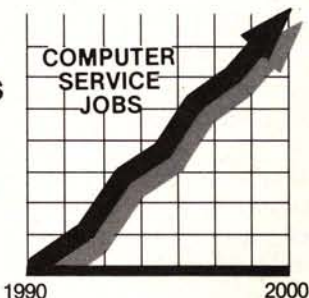
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regulator. That is Pin 2 of the LM317. It should be 21.0 volts, give or take not more than .3 volts. In other words, it should be between 20.7 and 21.3 volts. If not, you should change the value of R4. The resistance should go up if the voltage is too low and down if too high. This may require that you use a combination of resistors. This is

After you have the proper voltages, it's time for the "smoke test." Plug the board into your computer and power it up.

normal, as not all values of resistors exist and most likely not the ones you need. Murphy's Law! Do the same with the other side; jumper JP2 set to 2 and 3. This time the voltage should be 12.5 volts.

After you have the proper voltages, it's time for the "smoke test." Plug the board into your computer and power it up. If your computer does not come up as usual, turn it off right away and check the board again. If all is well, start checking the circuit. Before you start, however, know where the EPROM programmer is memory-mapped and what each byte does. Table 1 is a memory map for the EPROM programmer.

Using the information in Table 1, you should be able to test all the functions of the EPROM programmer before trying it out. The only tool you need to make these tests is a logic probe. It is impossible to do without one. At different stages of the test you must type in a BASIC program, usually only one line long. It is necessary to test the hardware.

The first test we will make is the counter. Type in this one-line program and run it:

```
10 POKE &HFF52,0 : GOTO 10
```

This should pulse the address counter. Properly connect the logic probe and place your probe on Pin 13 of U4. You should see a pulse. If not, check all the connections to U4. Next check the other output pins of U4;

there should be no other pulses. On the ZIF socket check that all address lines from A0 to A11 are changing between High and Low. Start from A0 and work your way up. Notice that as you go up in address lines, the pulse is longer and longer. This is because each address is doubled in time. Make sure all address lines change. If they do not, check the wiring from U5 to U7. If not, see that Pin 10 of U5 has a pulse and Pin 11 is Low. Next change the BASIC line above from &HFF52,0 to &HFF53,0 and run it. With the probe make sure Pin 11 of U5 is pulsing. That is the Reset line to the address counter.

The object of the next set of tests is to make sure the Control byte controls all the right things. When I tell you to poke a new value into the control byte, use the following line:

```
POKE &HFF51, &Hxx
```

Note that there is no line number, and *xx* should be substituted with the actual value needed to test that particular area. Using the line above, poke the value &HFF. With the probe, check the following to make sure they are all High. On U7 (ZIF socket) check A12, A13, *OE, *PGM and *CE. Poke &HFE. A12 should be Low, and the other four should be High. Next poke &HFD and check A13; it should be Low and the rest High.

For the third test, poke &HFB and check *OE for a Low and the rest High. For the fourth test, poke &HF7 and test *PGM for a Low and the rest High. As a last test, poke in &HEF and test *CE for a Low and the rest High. If all of those check out, you are well on your way to EPROMing.

Now poke &HFF. Check that Pin 1 of U2 is High. This is the Write Data Enable pin. Now, poke &H7F. Check Pin 1 of U2 again. It should now be Low. If not, see that pins 8 and 9 of U6 are wired properly.

In order to test the last two outputs of the Control byte, you need a small load to properly test the voltage. Using an EPROM as a load is not recommended, because if there is something wrong, chances are you will burn out the EPROM. A 1K resistor works just as well and is much cheaper. Besides, you won't burn a 1K resistor even with 21 volts.

Using the ZIF socket, insert the resistor from ground on Pin 14 to V_{CC} on Pin 28. Poke &HFF. With a volt meter, measure the voltage across the resistor. It should be 0 volts or real close. Now poke &HBF. Again measure the voltage across the resistor. It should be close to five volts but not less than 4.6; if not, check the circuit wiring of Q2, R3, R8 and U6C. This circuit turns the EPROM on and off.

After that is working okay, change the

resistor from Pin 28 to V_{pp}, which is Pin 1. Poke &HFF and with the volt meter check that there is 0 volts across the resistor. Poke &HDF and check the voltage again. This time it should be either 21 or 12.5, depending on what JP2 is set to. If you don't get either of these voltages, measure the voltage between the emitter of Q1 and ground. There should be 21 or 12.5 volts; if not, check the voltage regulator U8. If there is improper voltage, check Q1, R2, R7 and U6D for improper wiring. Once you get that working, there is only one more set of tests to do.

To check if the write data latch is wired properly, these tests are necessary. To use the write data latch you must first enable it. This is done by poking D7 of the control latch to a 1. Therefore, enter:

```
POKE &HFF51, &HFF
```

The write data memory location is \$FF50; therefore whenever I tell you to write data to that location, the new command you must enter is as follows:

```
POKE &HFF50, &Hxx
```

Again, the *xx* value depends on what I tell you to put in there. To see if the latch is working, first poke &H00. With the probe, check U7 (ZIF socket) pins 11 to 19. They should all be Low. Now poke &H01. Pin 11 (D0) should be Low and all other data lines High. If not, check the wiring to U2 and the wires between U2 and U7. Poke &H02, check D1 for a High and all others Low. Make six other tests using &H04 for D2, &H08 for D3, &H10 for D4, &H20 for D5, &H40 for D6 and finally &H80 for D7.

To test if you can read this latch, all you have to do is poke a value to the write data latch and read it back at the same location. When the write data latch is enabled, you can read back your own data, providing that the EPROM is not enabled. If it is, there will be a data conflict. (Never have the write data latch and the EPROM enabled at the same time.) To test the ability to read the EPROM correctly, poke a variety of numbers into \$FF50 and peek at them. The value you read should be the same value you put in. If not, check the wiring to U1. To peek at Location \$FF50, type:

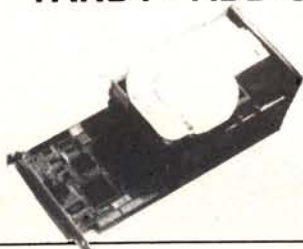
```
PEEK(&HFF50)
```

If all the above tests pass, you are ready to put in some software and try to program an EPROM. Next month I'll give you a fully commented listing of the program to make this programmer work. It is in assembly language, but I will also include a BASIC loader program that you can type in if you don't have an assembler.

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Online Interactions

by **Eddie Kuns**
CoCo SIG Database Assistant

You'll notice the format of "Database Report" has changed this month. It now looks like a directory listing; it is part of "Delphi Bureau." The new format should give you more information in fewer words. Most of the filenames listed are pretty self-explanatory; only uploads with nondescriptive names or uploads of special interest are mentioned in the editorial.

One posting worthy of note is Rick Adams' TSEdit patch. This upload in the OS-9 Patches database adds many new features to the TSEdit text editor. It allows it to work on OS-9 Level II windows as well. Also in the OS-9 Patches database are the *GShell+* patches mentioned by Dale Puckett in "KISSable OS-9;" they were posted by Zack Sessions.

In the OS-9 Telecommunications database, Wayne Laird submitted a list of Color Computer OS-9 BBSs. Mike Knudsen posted the long-awaited documentation of the *Ulti-MusE* file format in the OS-9 Graphics & Music database. Tim Koonce released *View* Version 3.1, which displays several graphics formats. He also collected information on various graphics formats together under one heading — "Graphics Formats."

Zack Sessions released the *agfx.l* graphics library for OS-9 assembly programmers into the OS-9 Programmer's Den, which goes along with Bob van der Poel's RMA function library *alib.l*. In *Tutorials & Education*, Albert Semeluk contributed a long and detailed explanation of how you can change a module's name in OS-9.

Eddie Kuns is pursuing a PhD in physics at Rutgers University. He lives in Aurora, Illinois and works as a programmer and researcher at Fermilab. Eddie is co-manager of the CoCo SIG; his username is EDDIEKUNS.

In the CoCo SIG General Information database, Kelly Thompson released an article detailing his first few months of using OS-9 as a guide for others. Donald Ricketts wins the uploading endurance award this month with his large number of uploads in the CoCo 3 Graphics database, including a program to view DS69-generated pictures. Alvin Kimball posted a different viewer — one to view pictures generated with *MacPaint*. He also posted *CCDial*, a pull-down, button-driven application for dialing the phone and organizing disks.

Frank Hogg released information about the new Tomcat computer from Frank Hogg Laboratories in the Product Reviews and Announcements database. Wayne Laird posted a slightly different version of his list of BBSs in the CoCo SIG Telecommunications database.

New Database and Forum Areas

Three new database areas (and forum areas) have been added to the Delphi SIGs. The OS-9 SIG has gained New Uploads and Grits & Gravy. New uploads will be placed

Database Report

OS-9 SIG Database:

Applications:

Calculator Program	
JSHERMAN	Joel A. Sherman
Simple Menuing System	
VAXELF	John Donaldson
Revised SMenu	
SEBJMB	Jeff Blower

Utilities:

Attr with Wildcards!	
ZACKSESSIONS	Zack Sessions
Winfo.pak	
MAREK	Mike Weigel
Wdir.pak	
JMLSOFT	Jim McDowell
Cursive	
TRIX	John Farrar

Patches:

TSEdit Patch for Device Windows	
RICKADAMS	Rick Adams
GShell+ Patches	
ZACKSESSIONS	Zack Sessions
MFree Patch	
OS9UGPRES	Kevin Darling

Telcom:

CoCOS9er BBS List	
WAYNELAIRD	Wayne Laird

Graphics & Music:

Candy2.gif	
SUPERCHRIS	Christian Michaud
Glorious.ar	
BAMBOO	John Kou
Praise1.ar	
BAMBOO	John Kou
Playit.ss	
MKJ	Ken Heist
Ballade Pour Adeline	
MIKEHAALAND	Mike Haaland
Umeformat.ar	
RAGTIMER	Mike Knudsen
View 3.1	
TIMKOONCE	Tim Koonce
Graphics Formats	
TIMKOONCE	Tim Koonce
Swimwear.vf3	
TIMKOONCE	Tim Koonce
Looney Tunes	
HAZE	Hadley Hazen
Stairway to Heaven	
COCOROGUE	Jim Buck
Inv_5.bach	
PDUNC	Paul Duncan

in the New Uploads database area for at least one month to aid those who logon to Delphi only occasionally. This saves those persons from having to search each topic area separately.

The Grits & Gravy topic is used in the forum for non computer-related topics like Kevin Darling's many cats and the resulting pile of used cat-food tins (is it really visible from the airport?), whether or not grits are a foodstuff, and just how thoroughly you need to ground yourself when installing a memory upgrade. (You might think that last one is related to computers. Well, you'd have to read the thread to understand!)

The Soapbox (chitchat) forum and database topic is the new addition to the CoCo SIG. People had been complaining about the amount of Forum traffic unrelated to computers, some of it silly and humorous and some of it about philosophic issues. All of those non-computer-related forum messages now have an official home. The latest

The Soapbox (chitchat) forum and database topic is the new addition to the CoCo SIG. All of those non-computer-related forum messages now have an official home.

issues discussed (sometimes heatedly) include fourth amendment rights and the death penalty. Articles dealing with such emotional and non-computer related issues are posted in the corresponding database area, which contains silly and humorous files as well.

Conferences

There are currently three monthly conferences. All three occur at 10 p.m. eastern time. The topics, hosts and dates are:

- Games Programming — Steven Bjork, first Monday each month
- Using Delphi — Eddie Kuns and Tim Koonce, second Monday each month
- The CoCo Publisher — Jeff Parker, third Wednesday each month

Please drop in on these scheduled conferences with any questions. Remember that no question is too small, and the only stupid question is the one you don't ask. □

Programmers Den:

RMA Graphics Library
ZACKSESSIONS

Zack Sessions

Tutorials & Education:

Monapatch.txt
ASEM

Albert Semeluk

CoCo SIG Database:

General Information:

Considering OS-9? Read This
KMTOMPSON Kelly Thompson
CoCo4txt
DSRTFOX Francis Swygert

CoCo 3 Graphics:

Flamingo.cm3
SUPERCHRIS Christian Michaud
Cocodemo.bin
SUPERCHRIS Christian Michaud
Janet Jackson - DS69 4096
TRAS Richard P. Trasborg
Lyn Part 1
TRAS Richard P. Trasborg
Lyn2
TRAS Richard P. Trasborg

More CM3 Pix

JAYDEF Jason Becker
Nature Pix
JAYDEF Jason Becker
DS69View - A Real "Viewer"
STEVEPDX Donald Ricketts
Pretty Actresses
STEVEPDX Donald Ricketts
Living Dolls
STEVEPDX Donald Ricketts
More Living Dolls
STEVEPDX Donald Ricketts
Views of Christina Applegate
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STEVEPDX Donald Ricketts
Sports Illustrated Swimsuits III
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DAVIDMILLS David Mills
Viewmac
ALKIMBALL Alvin Kimball

Utilities & Applications:

CCDial
ALKIMBALL Alvin Kimball
Clock

DENNISH Dennis Hennen
Printer Works
DENNISH Dennis Hennen

Games:

Four Wheeler
DENNISH Dennis Hennen
Pan-Galactic Life Simulator
ALANDEKOK Alan DeKok

Classic Graphics:

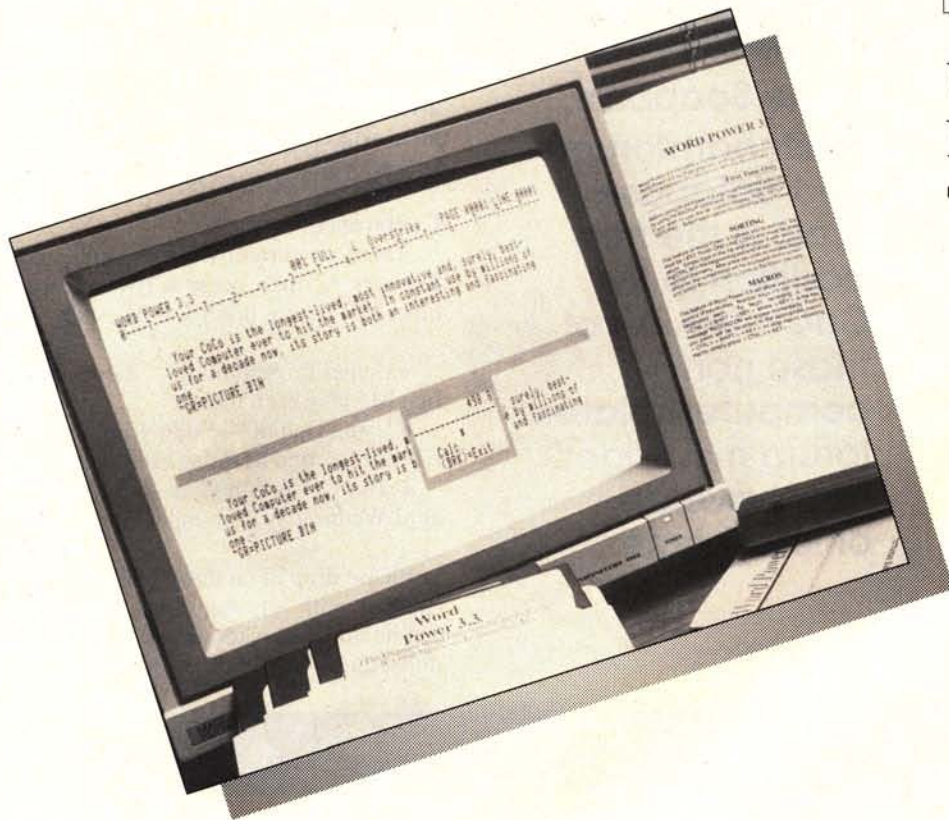
The Three Amigos
DENNISH Dennis Hennen
Blocks.bas
MSCHNEIDER Michael Schneider

Product Reviews & Announcement:

TomCat
FHOGG Frank Hogg

Telecommunications:

CoCOS9er BBS List
WAYNELAIRD Wayne Laird
Configure GeTerm V2.5
RICKMAC Richard McNabb



Word Power 3.3— Making a Good Thing Even Better

RAINBOW readers from way back may remember Thomas Poor's review of *Word Power 3.1* in October 1988. All the features mentioned in Mr. Poor's review are retained in *Version 3.3*. If you can't dig up the old review, take a look at Microcom Software's full-page advertisement for a listing of *Word Power Version 3.3*'s features.

Version 3.3 is designed for the Color Computer 3 with at least one disk drive. An 80-column monitor is desirable but not necessary because this version supports the CoCo 3's 40-column text mode. *Word Power* is not copy protected and comes in a four-disk set. One disk contains the main program, another is supplemental programs, and two are dictionaries.

What's new in *Version 3.3*? Well, the ability to sort lists has been added. You can take a list (one line of text with each line terminating in a carriage return), mark it with block markers, and issue a sort command. Also, the number keys 1 through 5 can be programmed to issue macros of up to 50 keystrokes each. This means if you have

a series of commands you frequently use, you can program *Word Power* so the entire sequence is issued by pressing CTRL and the appropriate macro key.

What else? *Version 3.3* adds the ability to save parts of a text file and to incorporate graphics from *CoCo Max III* into a text file. *Version 3.3* can also make automatic backups and comes with an 80,000 word spelling checker on two separate disks (more on this later).

Other enhancements, which actually originated in *Version 3.2*, include a 115K printer spooler, automatic reformatting of text and a two-column format. Automatic reformatting is a nice feature. In many word processors, including some MS-DOS programs, when you change a line of text you must issue a format command to realign all subsequent lines. There is no good reason why the user should be forced to reformat the text. That's what computers are for. *Version 3.3* takes care of that problem by reformatting lines automatically.

I had only a short amount of time to

experiment with the graphics feature and two-column print feature but I was suitably impressed. Newsletter publishers will find some uses here, especially those with good dot-matrix printers.

Other features include a handy pop-up calculator and a split screen function that lets you freeze a selected portion of text on the top half of the screen while you continue working on text in the active window on the bottom half of the screen. One thing in particular that I liked was the set-up program explained in Mr. Poor's review. It lets you set many of *Word Power 3.3*'s default parameters, thereby minimizing much of the startup litany one goes through on every power up.

The real appeal of *Word Power 3.3* is in Microcom's continued commitment to ease of use and employment of the CoCo 3's added memory and enhanced graphics capabilities. Functions like file saving, file loading, centering, block manipulation and locate/replace all use colorful pop-up windows and permit the user to select from a

menu using the arrow and ENTER keys.

I believe *Word Power 3.3*'s approach to printer codes may be a bit more manageable than some I've had experience with. Once the printer codes are entered into the permanent set-up file, printer features like underlining, bold face and italics can be selected by their names from a menu. All this is done without embedding a patchwork of confusing codes into the body of the text. While *Word Power* does not reproduce the fonts on the screen, it color codes the selected text on the screen so that the embedded codes are apparent but not distracting. This approach is more organized and it looks nice.

I was very surprised to learn that even with the abundance of *Word Power* features, you cannot disable the word-wrap feature. For many this doesn't mean much, but if you program and edit your programs with a word processor, the lack of this feature could be a major inconvenience.

In the tales of terror department, on one occasion I was disappointed to learn that *Word Power* had no Reset protection. Thus I was unable to recover my text in one of those out-of-control moments when I had apparently used an incorrect code.

The locate/replace function automatically masks the case of a character; therefore, *Word Power* does not permit one to distinguish between upper- and lowercase characters during a search. Sometimes I like to make that choice.

Another potential shortcoming is the fact that *Word Power* has a maximum line width of 120 characters (80 columns on the screen at one time). For almost all purposes

this is fine and probably 40 more than necessary; however, it is not good for previewing spreadsheet dumps or other applications that use condensed, 136-character-per-line printing format.

Earlier I mentioned that *Word Power* comes with a spelling checker program. While quite comprehensive (having the ability to suggest alternate word spellings), the spell checker is slow to the point of being intolerable. It would take approximately one hour to spell check a file the size of this review.

In spite of these last items, I found *Word Power 3.3* to be a thoroughly enjoyable program to use, as well as fast and visually appealing. I think it must be the most full-featured of the CoCo 3 word processors. It passed my tests with flying colors and earned itself a place along side those programs I call my work horses.

(Microcom Software, 2900 Monroe Avenue, Rochester, NY 14618, 1-800-654-5244; \$79.95)

— Ernest F. Zore

Meet Chris Santwani, Author of *Word Power 3.3*

What kind of response have your Word Power programs generated?

The response has been terrific! In fact, customer suggestions have helped to shape each new version of *Word Power*.

Is there one feature in particular that many people requested?

Yes, the ability to import graphics.

A feature that caught my eye was the 80,000-word spell checker. Did you create the spell checker or seek outside help?

I received license from Dale Pucket to use the spell checker. It was originally on eight disks. It has been compressed to fit on two disks.

Using the 80,000-word spell checker can be time-consuming. Is there a way to speed up the process of spell-checking?

There is an alternative. *Word Power 3.3* has a built-in 150-word spell checker consisting of conjunctions, pronouns and commonly used words. Another approach would be to load the larger spell checker onto a RAM disk, for faster execution.

What future endeavors are you planning for the CoCo or other machines for that matter?

I'm programming on the IBM and MAC and am interested in the Tomcat and the MM/1. The enhanced 68020 16-bit processor has its similarities with the CoCos 6809 8-bit processor.

Is there any particular aspect of programming for the CoCo that you haven't tried, yet would like to?

Graphics manipulation possibly.



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OS-9 Level II BBS, Version 3.0

In the past few years, more and more bulletin board systems have sprung up. Large users groups sponsor and support them; clubs, adults and kids from all over the world own and operate them. Each BBS varies in size, sophistication and success.

To operate *OS-9 Level II BBS*, you need the following:

- 512K CoCo 3
- At least two floppy drives
- Auto-answer modem (2400 baud preferably, but 1200 baud is okay)
- RS-232 port
- Telephone line
- BBS software package
- An operating system, in this case OS-9 Level II

The *OS-9 Level II BBS* is powerful and full-featured. If you are familiar with OS-9 Level II and have experience working in the OS-9 environment, there is very little this BBS system cannot do for you. There is a saying among hackers that the quality of the BBS depends on the quality of the SysOp.

It is refreshing to see a product with so much potential — ANSI graphics and downloads to special interest groups as well as conferences.

This BBS, however, might be a little tough for beginners — the package includes a rigorous manual that assumes the reader has a working knowledge of OS-9. If you are a novice, be patient and rely on friends for support. The system comes with a model BBS that you can tinker with while learning. There is even a game included for your first callers to download.

I called a number of OS-9 Level II BBSs around the country and was pleased and surprised at the variety I found. No two BBSs are exactly alike. In fact, I recommend visiting a number of BBSs before starting one of your own.

A few of the outstanding features of *OS-9 Level II BBS* from Alpha Software Technologies are: The system comes ready to run as is; it is generic, but ready to go online so you can get your feet wet; and it has built-in menus, or you can create your own.

There are a number of typographical

errors and misprints in the manual, some of which may throw you off. If you are familiar with OS-9, the mistakes are fairly visible, and the corrections can be noted in the manual. A minor annoyance is that the manual is printed in very small print, and several of the pages were out of order. Alpha Software Technologies agreed to rush me a new manual and it arrived promptly. (The correct telephone number and address for technical support appears at the end of this review; they are incorrect in the manual.)

This BBS also supports Xmodem, Xmodem CRC, Ymodem and ASCII file transfers, and it offers download validation and keyword searches. There is no capacity to broaden or narrow a search, but there are keyword searches.

Another terrific plus is the EMail system and special interest group areas. Here you can leave a forum message, chat with the SysOp, or talk with other users if you have a multi-channel modem.

The menu program is actually the heart of this program because it runs the different command files and scripts used to create the user interface. Moving around the system is as easy as a single key press.

Security is important for any BBS, and this one has a good security provision. It assumes a default of four user levels; these are expandable and definable, so you can have as many as you want. Initially the system is set for *SysOp*, with all the required privileges needed to maintain the BBS, the *new user* who has few privileges, the *standard user* with access to most everything, and the *elite user* who can do everything but be SysOp.

Another way to judge the quality of a BBS is by its accessibility for daily maintenance. The Alpha OS-9 BBS has an excellent set of built-in utilities that allow the SysOp to perform every function necessary to maintain the bulletin board. A unique device driver, called the double driver, lets the SysOp monitor the system while it is in use. The SysOp can also dry run the BBS by having it interact with an OS-9 window. This way the operator can test new additions and enhancements to the system as well as maintain it from the keyboard. The SysOp can also log in from a remote terminal to perform maintenance on the system.

One factor the manual does not address is that the system really bogs down when it is run from a floppy drive. There are times when a disk access might take up to 20 seconds just to find a password. This can be

avoided by using very fast floppies or a RAM disk. If you are serious about running a BBS with SIGs and EMail and file transfers, you need a lot of space and speed, which requires a hard drive. Don't be dissuaded by this; start small and grow into it, but if you are serious about running a board, plan on purchasing a hard drive at some point.

In conclusion, the *OS-9 Level II BBS* is a full-featured, sophisticated system. It operates under OS-9 Level II and supports all the major features common to BBSs, including file transfers with multiple protocols, conference modes, EMail, Special Interest Groups, ANSI graphics editor, encoding and filtering programs, a BBS monitoring program, and BBS operation by a SysOp, as well as a security scheme with password protection and one-touch menu operation.

If you are considering a BBS and want to use OS-9 as an operating base, I recommend this package. At \$29.95, you are not likely to find a better bargain. If you want to see for yourself, Alpha Software Technologies offers a free demonstration. Just call (504) 649-5761 and log onto an actual operating *OS-9 Level II BBS*.

(Alpha Software Technologies, 210 Bluefield Road, Slidell, LA 70458; 504-649-5176 or 504-649-5761 [BBS orders]; \$29.95, \$3 S/H)

— Jeffrey Parker

CIII D-Link

Imagine you are home from work, sick with the flu. There is, however, some business correspondence you must get out. Fortunately, you have a CoCo 3 at the office and one at home, and you also have *CIII D-Link*. With *CIII D-Link*, this chore is as easy as turning on the CoCo, grabbing your mouse, calling the office and sending the file.

This type of program has recently become popular on MS-DOS computers. It is a convenience that allows the user the capability of file transfer and remote control from one computer to another.

CIII D-Link is really a file transfer utility. Rather than completely controlling all functions of the remote computer, the user is limited to performing file functions on the remote CoCo or chatting with a user via a modem link with the remote CoCo.

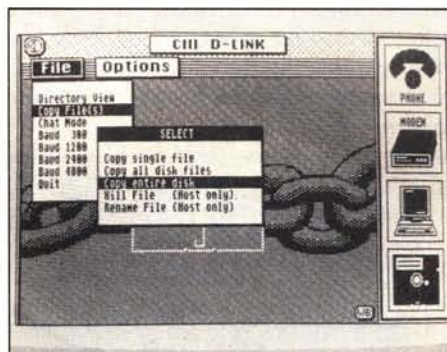
What do *remote*, *host* and *local* mean? A remote is a computer you call (and its operator by inference). A host is you and your computer. Local refers to functions — in this case file management — on your computer.

CIII D-Link requires a disk drive and mouse (highly recommended) or joystick. A modem or null-modem is also required. The modem is connected to the serial I/O port and reliably works with this program in the 300 to 4800 baud range. It may be possible to run the modem faster with the CoCo, but higher speed can cause errors. *CIII D-Link* does not support the Deluxe RS-232 Pak or the Direct Connect Modem Pak.

Although *CIII D-Link* is called a mini-host BBS in the manual, the program cannot be used as a BBS system. BBS features such as E-Mail, forum, bulletin board, security and others are not supported by the current version.

CIII D-Link allows you to copy, move, kill and rename files on the CoCo using a graphics user interface (also known as point-

and-click when referring to the mouse) and perform all of these functions on a remote computer as well, although file rename and



file kill are limited to the host computer and cannot be used with the remote.

CIII D-Link has some interesting and unique features. The whole program is based on icons and pull-down menus; the only real typing comes when it is time to rename a file or chat with the remote computer. The system is based in RS-DOS, but can handle backing up OS-9 disks as long as they are 35-

track disks. Another feature of *CIII D-Link* is the calendar look-up option, which features a calendar window for the years 1989 through 2000.

CIII D-Link comes with a nice manual with more than 34 actual screen shots and clearly written text. It is one of the easiest file transfer programs ever devised for the CoCo. *CIII D-Link* runs on the CoCo 3 and can use any display.

CIII D-Link has a good set of error-trapping routines. It stops before overwriting an existing file with a file of the same name, and it beeps at you until you correct the problem. If you run into a problem during a host to remote transfer, the program picks up where it left off and does not redo all the files. You can copy one file at a time or all files but no provision is made for picking a group of files to copy. Please note also that *CIII D-Link* does not format disks, so have formatted disks on hand.

Although the error-trapping routines are sound, every once in a while I encountered an error not readily replicable; an error

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Hamlet, NC 28345, (919) 582-5121



occurred and the program crashed. I talked with program author Walter Bayer, and he assured me that this problem has already been corrected. Mr. Bayer immediately shipped me a new release of *CIII D-Link* and a newly updated manual, which arrived promptly, so you can count on good service from this company.

During our telephone conversation, I also pointed out to Mr. Bayer that for the program to be used for communications, (since *CIII D-Link* can only communicate with another computer using *CIII D-Link*), the user would need to buy two copies to use it at home or work. Mr. Bayer explained that since the product carries a single-user license, single users could use the program in one or two machines simultaneously, but they would be limited to that. Use with other users requires that they also purchase the program. He pointed out that updates and upgrades can only be provided to single licensed and registered users.

CIII D-Link is fast, easy to use and very useful. It is a good program for file transfers and includes a terminal mode. While I do not agree that it is a BBS mini-host because of its limitations, it is handy to have and an interesting step in the right direction for CoCo users.

(Coless Computer Design, 1917 Madera St. No. 8, Waukesha, WI 53186; 414-549-0750; \$24.95, two complete packages for \$29.95; plus \$3 S/H)

— Jeffrey Parker

Game	CoCo 1, 2 & 3
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The Arcade Factory

A name like *The Arcade Factory* evokes visions of designing the arcade games I've only dreamt about. I felt let down when I realized *Factory* is a utility package for a certain type of game. But once I spent some time with *The Arcade Factory*, I realized the unexpected was happening — I was having fun!

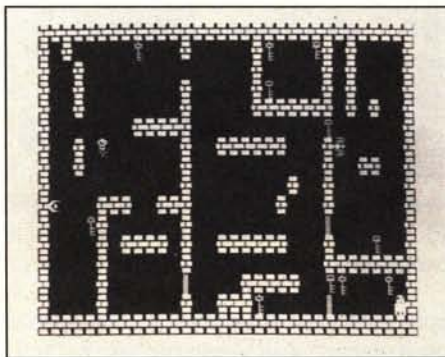
Factory lets you create, edit and store on disk any number of *Pacman* or *Dig Dug* type game modules. There are several restrictions in the construction of these modules but enough built-in variations for several dozen interesting distractions.

The object of these games is for your character to travel around the game screen, picking up goodies while avoiding creeps and booby traps. Sometimes, though, this can get rather complicated.

One sheet of instructions is supplied with *Factory*, and the menu-driven editor takes you through the construction process.

The onscreen instructions are marred, however, by poor grammar, missing punctuation and misspellings.

First you are asked if you want to edit a previously saved game. Next, you set the speed of play and sound, followed by information such as the number of goodies your character must collect, whether or not the creeps can eat the goodies, game control adjustments and speed. All of these are changeable using the editor program, and altering them changes the difficulty of the games.



There are always four creeps on the screen (one of the parameters you have no control over) starting in the corners. You decide if they will chase your character, follow a path, move randomly or stand still. I found four still monsters to be extremely dull, while four fast creeps chasing me was a bit more than I could handle.

The next nine steps require most of your time. You must use the graphics screen to design the appearances of your character, creeps, goodies, booby traps, filler and the all-important wall. (Filler is an area you can walk through, but the creeps can't.)

The drawing routine is extremely easy to use, especially with the Zoom feature, but it suffers one drawback. All of the characters are too small. At eight pixels wide and 12 pixels high, the characters are sometimes difficult to find or distinguish on screen. If you are using a CoCo 3 with an RGB monitor, this may not be a problem.

Due to the character size, not much detail can be put into each. My sister and I resorted to using graph paper to design nice looking heroes and creeps before we committed them to the computer screen.

The final design stage, as it is called, is to make a map of the playing area. Using the keyboard, you place filler, walls, goodies and booby traps. Once again, graph paper is helpful in building a good maze. Now just save the game and play it.

As mentioned before, the rules to all of the games you create are the same. Your character, which starts in the center of the screen, must pick up the required number of goodies while avoiding creeps and booby traps. A cleverly designed maze with enough

walls and not too many goodies can make each game interesting.

Each game session begins by loading the saved game module, followed by loading and executing the driver program *ARCADE*. Use the arrow keys to control your character in his sojourn around the maze.

In addition to the small characters there are a few things that bothered me about *The Arcade Factory*, one of which is the lack of a record of precious choices when editing a saved game. You must keep a written record of your game choices.

Another problem is exiting a game. You must reset the computer each time you want to load another game or return to the editor. Pressing any key after a game has ended restarts the game. All programs should have a way of exiting without resetting.

Because there is no game exit routine, I had to discard one of my ideas. I had planned to chain together several different games featuring the same characters and goodies, but with progressively harder mazes and faster creeps. *The Arcade Factory* as it stands, however, does not allow this.

B&B Software has supplied two sample games on the disk: *Digit* and *Dungeon*. *Digit* is a *Dig Dug*-type game, while *Dungeon* (complete with skull and cross bones) is more like *Pacman*. I confess to not being able to complete either one as of yet. I may have to edit both games slightly.

Summing it up, *The Arcade Factory* is well worth the \$8 price, which includes postage and handling. For your money you get an almost endless variety of games, limited only by your imagination.

Jay Braxmaier of B&B Software has indicated that there may be a game design contest sometime in the future, followed by a "best of" disk.

The Arcade Factory runs on any Color Computer 1, 2 or 3.

(B&B Software, 1637 Hanchett NW, Grand Rapids, MI 49504; \$8 includes S/H)

— James Walton

Disk Utility	CoCo 1, 2 & 3
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Master Catalog

This cataloger is just what most disk users need. As the documentation suggests, I do have hundreds of disks and have spent a lot of time searching for particular programs. *Master Catalog* changes all that.

The first thing that caught my eye was the documentation — three pages of easy-to-read type. After a brief introduction, the documentation explains the commands and

recommends the best sequence in which to use them.

The Search feature works with lightning speed.

The menu is self-explanatory, but those with double-sided disk drives must read the instructions. Both Disk BASIC 1.0 and 1.1 are supported and 32K is required, but all 64K will be used if available. The memory is automatically checked.

There are actually two programs offered separately: *Master Catalog* (for the CoCo 1, 2 and 3) and *Master Catalog III* (for the CoCo 3 with monitor). *Catalog III* can be

used with a TV set, but it is suggested that the CoCo 2 version is more satisfactory. You must specify the CoCo number and Disk BASIC version when ordering.

I used some of my T & D Subscription software disks for the test run. The program read the directories as fast as I could insert the disks and type the identification number (four characters allowed). The identification is required to use the Delete feature mentioned later. The total number of files copied is shown at the bottom of the screen. This verifies that the directory has been copied. After cataloging, I saved the list before proceeding to other features.

After each command, I used LIST to see what had happened. If the list is longer than one screen, there is a prompt to get the next screen or go back to the menu at the end. If you want to quit sooner, press BREAK.

The next feature I tried was Sort. My list had over three-hundred files and took a bit longer to sort than to read. The documentation states that the maximum list of 3000 files takes about an hour to sort on the CoCo 2 or thirty minutes with the CoCo 3. I do not suppose sorting is needed often; but you can add to shorter lists (limited by memory) and will want to re-sort at that time. Again I saved the list.

The Search feature works with lightning

speed in the usual fashion — every program with the search string in its title is listed.

A directory is available with Info, in case you forget your catalog names. This feature works with any disk, so you don't have to exit to check out a disk.

Clear erases memory for the start of a new list. Be sure to use Save first. Of course, the saved files may be loaded.

Delete is a nice feature, but limited. All programs on the designated disk are erased quickly, but no single program can be erased. To do this, you must first delete the entire disk (remember the need for an ID number) and then add the revised disk to the catalog, effectively erasing unwanted programs.

Having a catalog to search on screen is good, but there is more. Print produces a beautiful hard copy suitable for use in a binder. Set the paper at the right place and type in your title (31 characters allowed) and away you go. The pages are titled, numbered and proper headings used showing filename, grants used, disk ID# and Side A or B. Ninety files are listed per page in groups of five, in two columns, nicely centered with top and bottom margins that skip the perforations.

This is a great program for people who want a fast, easy-to-use catalog of their

STUDENTS and TEACHERS

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Your new Tomcat has 8 bit D to A and 8 bit A to D for better sound and a higher joystick resolution. In fact, your same CoCo joystick will give you 256 pixel resolution instead of the 64 they now support!

It uses a PC-AT style keyboard and a PC-style power supply. If it is just the board you want, it will fit in any PC clone case.

What is *significantly* important is that you can use a large amount of your present software with the Tomcat! Right. You don't have a major expenditure for new software.

The Software Advantage

Your new Tomcat is compatible with Radio Shack DOS. It will run most of the programs you use every day. As an OS-9 machine as well, it will also work with all OS-9 software you either own now or plan to buy in the future. All of your CoCo cartridges like those from Disto and Burke & Burke except for ROMpaks will work with your new Tomcat as well.

But there are even greater advantages to the Tomcat system --

and an affordable path to upgrade your CoCo without losing *any* of the value you have in your CoCo system today.

Tomcat is also compatible with the FHL K-Bus, which means you can interface it to a 68000 CPU, or even the 68030. While that sounds very technical, the truth is it is as easy as plugging in a couple of boards. And once it is done, the Tomcat becomes just like two computers in one -- your own, reliable (but faster and more powerful) CoCo, and a 68000-based computer which will run OS-9 programs 30 times faster than before.

Its a New World

With a 68000 or 68030 CPU, you have the whole world of OSK available to you. This means a whole world of new software, a whole world of additional memory (up to 16 megabytes, of which 14 is RAM), and even the opportunity to further increase performance.

Most important to you, this is upgrading without throwing anything away! Much of your present software will work. Many of your cartridges, disk drives, printers will just connect into place. New horizons open with new software and new boards which will make your own CoCo continue to be your cost-effective, friendly helper and companion as computing moves into the 90's.

The Future

The Tomcat is the upgrade path designed for you.

Take it at your own pace -- as your time, needs and pocketbook permit. If you currently own a CoCo 3 and use it in either the Radio Shack DOS or OS-9 Level II mode, Tomcat will operate your software faster and better. It will also give you powerful new features and performance at a modest cost.

If you decide to switch to a 68000 CPU-based computer completely, Tomcat is still the answer. You use your present hardware and gain the advantage of using the heart of the Tomcat, the TC9 main board, as a multi-function graphics processor!

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disks. Those who want to add comments need to find a different program. Some of the files are pictures or subroutines used by a master program; if the name is different, it appears on the list in a separate place that could be confusing. It might be a good idea to check the directories for these programs at the time the catalog is made and then mark them on the printout.

(Second City Software, P.O. Box 72956, Roselle, IL 60172; 312-653-5610; \$19.95 each, \$2.50 S/H)

— Audrey De Lisle

Miscellaneous

CoCo 1, 2 & 3

Keyboard Template

Picture if you will, a novice programmer hunting through the CoCo manual to find the correct functions and commands to use in his/her latest creation. There is a scrap piece of paper laying on the desk with commands and definitions scribbled on both sides.

It would be great to have all the commands in view for quick reference. P & M Products offers a keyboard template to

solve this very problem: a laminated 15-by-6 inch poster board template cut out to fit onto the CoCo keyboard.



Printed on the template are all of the commands, with short definitions, for the CoCos 1, 2 and 3. Commands are grouped into the following categories: Lo-Res graphics operations, Hi-Res graphics operations, math and trig operations, housekeeping, miscellaneous operations, print operations, screen commands, string commands, load- ing and program operations.

This product does not supersede the CoCo manual; although, once you have read and understand the manual, the template serves as a handy reference for those easy-to-forget commands.

After using this product, I immediately

thought of programs that would be easier to use with templates: word processors, spreadsheets, and the various alternative DOSs for the CoCo.

Keyboard Template is proof that a simple idea, as useful as it may be, often goes overlooked.

(P & M Products, 1003 Shalimar Drive, High Point, NC 27262, 919-887-2236; \$6.95, plus \$2 S/H)

— Tony Olive

Hardware

Star Micronics XB-2415 Printer

Dot-matrix printers have definitely come a long way in little over a decade. When I saw the first compact, inexpensive computer printers (like the Tandy Line Printer II and Epson's original MX-80), I remember saying that they were great for program listings and invoices but would never do for word processing. But people did indeed print letters, memos and class work on the "cheap" printers. Manufacturers put out

MLBASIC 2.0 - BASIC Compiler

If you want your BASIC programs to run up to 50 times faster, or want more programming features without learning another language, MLBASIC is for you.

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MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only \$59.95, you can have a programming language that will spark your interest once again in the COCO.

Before you buy another BASIC compiler for the COCO, find out if it supports everything MLBASIC supports. Then look at the price tag. We feel that it won't be long before you place an order for MLBASIC.

"MLBASIC is a fine program for any serious programmer," said David Gerald in the December 1987 RAINBOW.

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RAINBOW
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newer models with more features, faster printing, friction feed and — most importantly — higher resolution to provide better print quality.

The printer market has reached a point where 9-pin printers are being sold to novice

In terms of text operation, the biggest attraction is probably the wide range of fonts available

computer buyers at under \$200; more experienced users are quickly moving up to 24-pin printers that can form characters almost indistinguishable from the output of the best office typewriters. After making a big splash a few years back with the Gemini series of low-priced 9-pin printers, Star Micronics has continued to expand its line; the Star XB-2410 and 2415 are 24-pin, color-ready printers that not only hold their own at the high end of the 24-pin market but add a wide array of built-in fonts and sizes that can really perk up a printed page.

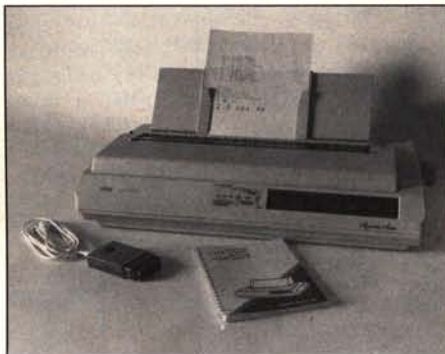
The XB-2410 handles 10-inch wide forms, while the XB-2415 is a wide-carriage (15-inch) printer; both can handle tractor (pin) feed and friction feed, so you can use almost any paper you want — “computer paper,” forms, labels, letterhead or what have you. As with several of the latest 24-pin printers, the tractor is located before the platen — not above it — which lets you load the printer without wasting a form. The printer automatically feeds a single sheet of paper when you drop it into place and press the Set/Park Eject button; if you have pin-fed paper loaded and want to use a single sheet, you can easily park the tractor paper and re-feed it later. A paper guide snaps into place to make it easy to insert a sheet at the right place along the platen, and a sheet feeder unit is available as an option.

As with most Star printers, the XB-24xx series normally emulates an Epson printer, in this case the 24-pin LQ-1050; a DIP switch change sets the printer to emulate IBM's Proprinter X24 and XL24, so between these two there should be no problem using existing applications. The DIP switches only affect the emulation mode, default character set and page length; everything else is stored in non-volatile memory and can be changed from the front panel using a series of menus.

The printer really shines when a program has been written to use its special features, because there are a number of things available here that aren't available on the emulated Epson or IBM printers.

In terms of text operation, the biggest attraction is probably the wide range of fonts available. In addition to the draft font, fourteen letter-quality fonts are also built into the printer. Courier, Prestige and TW Light are typewriter-style faces, as is the Script font. Letter Gothic and Orator are useful for special applications. The Tms Romn, Helvet, Blippo, Optimo and Cinema fonts add a typeset look to your document. A Greek typeface is also available.

For special applications, there are OCR-A and OCR-B fonts for character recognition and a Code 39 bar code function. Each of these fonts can be selected by an escape code sequence, as described in the printer manual. You can set any one of these to be used as a default font in the printer setup mode. The Tms Romn, Helvet, TW Light, Courier, Prestige, Script and Cinema fonts can also be selected from the front panel of the printer, so these fonts can be accessed without worrying about print codes.



The many typefaces become even more useful when combined with the different sizes available. As with most printers the XB-2410 and 2415 can do things like compressed or expanded printing. But here the ranges goes all the way from half-width and half-height to quadruple width and height. (As you might expect, the resolution of the large print modes is somewhat coarse, because a character is formed with the same number of dots regardless of the selected size.)

In addition to the now common italic and underline modes, these printers can also perform outline and shadow printing. All these modes can be accessed using control codes. The front panel allows selection of the 10 cpi (pica), 12 cpi (elite), 15 cpi, proportional and condensed modes.

Text printing can be done in any of three modes, depending on your needs. The draft mode prints at a rate of 200 characters per second while providing better quality than most 9-pin printers. When you switch to the LQ mode, allowing access to the different fonts, printing slows down to “only” 67 cps, which isn't that much slower than the older 9-pin models. With the Tms Romn and TW Light fonts, a special super LQ mode using two passes to print each line provides even higher resolution.

The XB-2410 and 2415 have graphics capabilities that are easily a match for the superb text modes. Bit-image graphics resolution ranges from the standard 60 dpi up to 180 dpi, and with some restrictions a resolution equivalent to 360 dpi can be obtained.

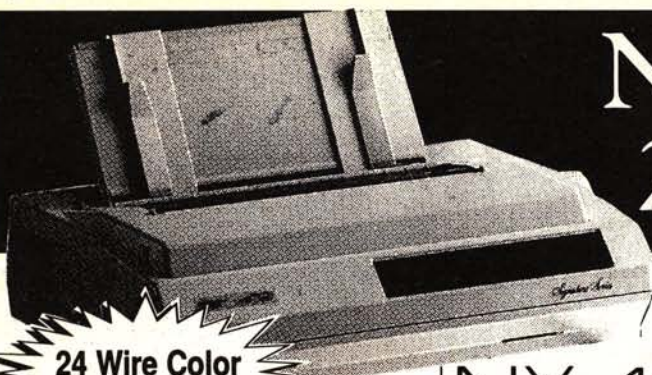
This brings us to the other big advantage of these printers — they can print in color by installing a stepper motor adapter that just drops into a slot under the ribbon cartridge. Once this is in place you can install an X24CL color ribbon to print in multiple colors, using one pass for each of the four ink colors: black, yellow, magenta and cyan. A simple code sequence sets the printer to print in red, blue, violet, yellow, orange or green as well as black. With special software you can print in even more color combinations by printing overlapping dot patterns in different colors.

Dayton Associates' packages for the XB-2410 and 2415 include the color stepper motor and a color ribbon, the Blue Streak Ultima serial-to-parallel interface and a special support disk. The disk includes two different full-color screen dump programs — one for the CoCo 1 and 2, the other for the CoCo 3 — that can print anything saved in the normal screen memory areas. The other noteworthy features are a step-by-step guide to setup and configuration of the printer for use with the Color Computer, an interactive tutorial on the use of the control codes that can also be used as a menu-driven mode-changing utility, and a test program for the serial-to-parallel interface. I'd say that the Star XB-2410 and 2415 are a really hot pair of printers.

(Dayton Associates, 9644 Quailwood Trail, Spring Valley, OH 45370, 513-885-5999; 10" model \$499.95 + \$15 S/H, 15" model \$699.95 plus \$20 S/H)

— Ed Ellers

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The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

VED, a full-featured, screen-oriented text editor. Can process files up to 55K in length. Features all the standard editing functions (read, append, save, block commands, etc.) as well as some specialized OS-9 options. Written in assembler and very fast. Comes complete with extensive manual. Requirements are 128K CoCo 3 and OS-9 Level II. *Bob van der Poel Software, P.O. Box 57, Wynndel, B.C. V0B 2N0 Canada or P.O. Box 355, Porthill, ID 83853-0355, (604)866-5772; \$24.95 plus \$2 S/H.*

VPRINT, a full-featured text formatter. Reads files produced by any text editor via both "dot" and "embedded" commands, and formats and prints documents. Has standard features such as margin control, justification, headers and footers; also supports footnoting and indexing. Works with any printer and comes with initialization files for many common printers. Has complete support for proportional fonts and can be used with the new laser printers. 124-page user's manual included. Requires OS-9 Level II with at least 56K of available memory. *Bob van der Poel Software, P.O. Box 57, Wynndel, B.C. V0B 2N0 Canada or P.O. Box 355, Porthill, ID 83853-0355, (604)866-5772; \$29.95 plus \$2 S/H.*

NFL Helmets Scrapbook, a picture disk for use with Colorware's *CoCo Max III*. Has six picture files saved in scrapbook format, each containing a different division of the National Football League with the helmets of each team in that division. A total of 28 helmets included on the disk. *Kathy Rumpel, Route 1 Box 67-A, Arcadia, WI 54612, (608)323-7046; \$10.*

KJV on Disk #9, chapters 30 through 34 of the Book of Deuteronomy and Joshua in the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. A word processor or text editor is recommended for viewing the files. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312)998-1656; \$3.*

KJV on Disk #10, Judges and Ruth from the King James version of the Bible, in ASCII files for the CoCo 1, 2 and 3. A word processor or text editor is recommended for viewing the files. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312)998-1656; \$3.*

CoCothello 1.4, plays like the popular board game, *Othello*. Includes an 8-by-8 playing board with red and blue tokens. Capture board square by outflanking your opponent. Require a 128K CoCo 3 color monitor (TV acceptable), mouse/joystick, OS-9 Level II, and the *WindInt* module from your *Multi-Vue* disk. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919)675-2426; \$10.*

Pyramid Solitaire 2.2, a variation of *solitaire*. Cards are dealt in a pyramid. The object is to remove free cards from the pyramid in pairs that equal thirteen. Minimum requirements; CoCo 3 256K, color monitor (TV acceptable), single-button mouse/joystick (keyboard mouse supported), OS-9 Level II, and the *WindInt* module from *Multi-Vue*. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919)675-2426; \$10.*

CoCoYahtzee 1.2, the popular dice game now available for OS-9 users. Minimum requirements are CoCo 3 256K, 80-column monitor; mouse/joystick recommended (keyboard mouse supported), OS-9 Level II and the *WindInt* module from your *Multi-Vue* disk. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919)675-2426; \$10.*

Spectral Forces, an interactive Adventure for the CoCo 3 and disk drive. Players assume the role of Lab, a reluctant Adventurer who has been commissioned to rid the land of an ancient evil. Features an original scenario, dozens of creatures and various displays. Hard copy feature allows Adventurers who own printers to make a printout of all room descriptions encountered and commands issued. *Marc Cambell Innovations, 266 Riverview Drive, Ephrata, PA 17522; \$24.95 plus \$2 S/H.*

CEBBS 2.1, an updated version of CEBBS (CoCo Electronic Bulletin Board System) with added features. Includes an IBM ANSI graphics option and a completely new file transfer section including Xmodem and Ymodem (checksum and CRC), ASCII downloading, keyword searches, filetypes, full filenames and more. Compatible with all older versions of the program in terms of file structures for message

base, userlog, etc. *KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, (407)799-3253; \$49.95 plus \$3 S/H.*

Word Power 3.3, a word processor with a number of enhancements and modifications to *Word Power 3.2* such as graphics, sorting, macros, 80,000 word spelling checker, mail merge, 40-or 80-column display, partial save feature, split-screen editing and much more. Requires a CoCo 3 and disk drive. *Microcom Software, 2900 Monroe Avenue, Rochester, NY 14618, (716)383-8830; \$79.95.*

MVCanvas 2.0.2, a simple-to-use, VEF format graphics editor for use under the OS-9 Level II *Multi-Vue* environment. Features include clip functions, palette switching, multiple-font support, digitized picture importing and editing of four different screen resolutions. Print drivers provided for a wide range of dot-matrix printers. *Hyper-Tech Software, 4341 Gannet Circle, #174, Las Vegas, NV 89103, (702)362-5346; \$49.95 plus \$3 S/H.*

Print7-R, a color print driver for the Star Micronics NX-1000 Rainbow printer with OS-9 Level II on the CoCo 3. Pull-down menus, simple to use. *G.T.T.D. Software, P.O. Box 187, Pablo, MT 59855, (406)883-2306; \$7.95 plus \$2 S/H.*

Planet Engine, A program that plots the position of planets, stars, moons and the Sun. Users can request orbits, precise data, planet drawings or skip around to any past or future time or location. Moon and all planets are shadowed to their proper phase. Requires OS-9 Level II and 128K. 512K; *Multi-Vue* recommended. *Gravity Studio, Box 791, Belton, TX 76513-0791, \$24 plus \$2 S/H. \$15 Introductory offer.*

First product received from this company

The Seal of Certification is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a Seal, the magazine certifies the program does exist — that we have examined it and have a sample copy — but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

Produce personalized documents
with this handy mail-merge utility.

If Wife = "Sue," Bring Your Potato Salad

by Christopher Jackson

OS-9

The Listing: TSMail

```
PROCEDURE TSMail
0000      (* TSMail interpretive mail-merge *)
0024      (* (C) 1990 C.K.Jackson *)
0048      (* PO Box 31 *)
006C      (* West Farmington, Me 04992 *)
0090
0091      PARAM Template:STRING
0098      TYPE fldstr=name:STRING[20]; text:STRING[100]
00B3      DIM Field(50):fldstr
00C1      DIM STDIN,STDOUT,WordCount,Count,x,y,z:INTEGER
00E0      DIM Path:BYTE
00E7      DIM Char:STRING[1]
00F3      DIM record:STRING[20]
00FF      DIM EvalStr:STRING[465]
010B      DIM EvalSub(12):STRING[100]
011C      DIM Boo1,Boo2,Boo3:BOOLEAN
012B      STDIN:=0
```

TSMail is an interpretive mail-merge utility that uses standard input and standard output to combine a database-like input file with a form letter template file to produce a series of personalized documents. It was created to compensate for the lack of mail-merge capabilities in Tandy's *TS/Word* word processor package. Because *TSMail* uses stdin and stdout, it should work with any OS-9 text editor. The command line for *TSMail* looks like:

`tsmail ("templatefile") <inputfile >out-
putfile`

The template file consists of two parts:

Chris is a student at the University of Maine at Farmington where he studies biology. His interests include computer modeling of biological systems, artificial intelligence, the Gospels and pizza. He may be contacted at P.O. Box 31, W. Farmington, ME 04992. His Delphi user-name is CKJCKJACKSON.

the input and output template. The input template assigns field names to each field in a record from the input file. If an input file made up of two records looked like this:

```
Jones
Bill
Sue
123 Oak Drive
Somewhere, USA
```

```
Doe
John
```

```
101 Single's Ave.
Elsewhere, USA
```

the input portion of the template file might look like this:

```
{lastname}
{husband}
{wife}
{address}
{town}
{blank}
{}
```

Each record consists of six fields with a blank line between it and the next record ({blank} isn't necessary, but it helps make the input file more readable). Notice that in the second record John Doe doesn't have a wife, so a blank line is left for that field. The input template is separated from the output template by an empty set of {} marks.

Unlike many mail-merges I've seen, *TSMail* is capable of interpreting a single level IF/THEN/ELSE statement to select a field to print. Constants can also be used instead of field names. Some examples of possible replacement fields to use in a letter are:

```
{field name}
```

```
{"constant"}
```

```
{IF field1 = field2 THEN field3 ELSE
"constant"}
```

```
{IF field1 <> field2 OR field3 = ""
THEN "constant" ELSE field1}
```

An example of a form letter output template might look like this:

```
{husband} {IF husband <> "" AND wife
<> "" THEN " and " ELSE ""}
{wife}
{lastname}
{address}
{town}
```

```
Dear {IF husband <> "" AND wife <> ""
```

```
0132      STDOUT:=1
0139
013A      (* load fieldnames from template-out *)
0161      OPEN #Path,Template:READ
016D      Count:=1
0174      LOOP
0176          READ #Path,record
0180          Field(Count).name=record
018F          Field(Count).text=""
019D      EXITIF record="{}" THEN
01AB      ENDEXIT
01AF
01B0      (* chop "{}" off fieldnames *)
01CE      Field(Count).name=RIGHT$(LEFT$(Field(Count).name,LEN(Field
(Count).name)-1),LEN(Field(Count).name)-2)
01FF      Count=Count+1
020A      ENDLOOP
020E
020F      (* load a record into fieldnames *)
0232      WHILE NOT(EOF(#STDIN)) DO
023D          FOR x=1 TO Count-1
0251              READ #STDIN,Field(x).text
0262          NEXT x
026D
026E      (* look for {} in template-in *)
028E      WHILE NOT(EOF(#Path)) DO
0299          GET #Path,Char
02A3          IF Char="{" THEN
02B0              EvalStr=""
02B7              WHILE Char<>"}" DO
02C4                  GET #Path,Char
02CE                  EvalStr=EvalStr+Char
02DA              ENDWHILE
02DE              EvalStr=LEFT$(EvalStr,LEN(EvalStr)-1)
02EE
02EF      (* look for "IF" then chop evalstr$ into words *)
0320      FOR x=1 TO 12
0330          EvalSub(x)=""
033B      NEXT x
0346      IF LEFT$(EvalStr,2)="IF" OR LEFT$(EvalStr,2)="if" THEN

0363          WordCount=1
036A          FOR z=1 TO LEN(EvalStr)
037C              Char=MID$(EvalStr,z,1)
038A              EvalSub(WordCount)=EvalSub(WordCount)+Char
039D              IF Char=" " OR Char="," THEN
03B2                  EvalSub(WordCount)=LEFT$(EvalSub(WordCount),LEN
(EvalSub(WordCount))-1)
                  WordCount=WordCount+1
              ELSE IF Char=CHR$(34) THEN
                  REPEAT
                      z=z+1
                      Char=MID$(EvalStr,z,1)
                      EvalSub(WordCount)=EvalSub(WordCount)+Char
                  UNTIL Char=CHR$(34)
              ENDIF
          ENDIF
          NEXT z

03CC      (* replace fieldnames with field text *)
03D7      FOR x=2 TO WordCount STEP 2
03E7          IF LEFT$(EvalSub(x),1)=CHR$(34) THEN
03F4              EvalSub(x)=RIGHT$(LEFT$(EvalSub(x),LEN(EvalSub(x))
-1),LEN(EvalSub(x))-2)
0402          ELSE
0415              FOR y=1 TO Count-1
0421                  IF EvalSub(x)=Field(y).name THEN
0423                      EvalSub(x)=Field(y).text
0425                  ENDIF
0430              NEXT y
0431          ENDIF
0459      NEXT x
046F      (* evaluate logic in "IF/THEN" string *)
0482      IF EvalSub(3)="" THEN
          IF EvalSub(2)=EvalSub(4) THEN
```


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THEN "Mr. & Mrs." ELSE ""}{IF husband
<> "" AND wife <> "" THEN lastname ELSE
"" } {IF husband <> "" AND wife = ""
THEN husband ELSE ""} {IF wife <> ""
AND husband = "" THEN wife ELSE ""},
I hope you {IF husband <> "" AND wife
<> "" THEN "both" ELSE ""} will be
attending the company picnic this year. See
you there!

Signed,
The Boss

TSMail
supports up to
50 fields per
record with
each field being
100 characters
or less.

```
{IF wife = "Sue" AND lastname =
"Jones" THEN "P.S. Remember to bring
your special potato salad, Sue!" ELSE
""}
```

As you might have noticed from the examples, *TSMail* supports AND, OR and XOR as well as "=" and "<>" comparisons.

There are some important concepts to remember when writing the input and template files. Each word or symbol in the IF/THEN/ELSE string must be separated by a space. The words IF, THEN, ELSE, AND, OR and XOR can be in upper- or lowercase but not a mix of both — i.e., Then or Else.

The field name given in the input template must match the field names given in the output template exactly, including capitalizations. If the input field name is "FirstName," the output field can't be "firstname."

TSMail supports up to 50 fields per record with each field being 100 characters or less. The number of lines in the input file must be equal to the number of fields described in the input template times the number of records. Empty fields must be represented by a blank line. □

```
054A      Bool=TRUE
0550      ELSE Bool=FALSE
0559      ENDIF
055B      ELSE IF EvalSub(3)=""<>"" THEN
056E          IF EvalSub(2)<>EvalSub(4) THEN
057F              Bool=TRUE
0585              ELSE Bool=FALSE
058E              ENDIF
0590          ENDIF
0592      ENDIF
0594      IF EvalSub(5)="AND" OR EvalSub(5)="and" OR EvalSub(
5)="OR" OR EvalSub(5)="or" OR EvalSub(5)="XOR"
OR EvalSub(5)="xor" THEN
    IF EvalSub(7)="" THEN
        IF EvalSub(6)=EvalSub(8) THEN
            Bool2=TRUE
        ELSE Bool2=FALSE
        ENDIF
    ELSE IF EvalSub(7)=""<>"" THEN
        IF EvalSub(6)<>EvalSub(8) THEN
            Bool2=TRUE
        ELSE Bool2=FALSE
        ENDIF
    ENDIF
    ENDIF
    IF EvalSub(5)="AND" OR EvalSub(5)="and" THEN
        Bool3=Bool1 AND Bool2
    ELSE IF EvalSub(5)="OR" OR EvalSub(5)="or" THEN
        Bool3=Bool1 OR Bool2
    ELSE IF EvalSub(5)="XOR" OR EvalSub(5)="xor" THEN
        Bool3=Bool1 XOR Bool2
    ENDIF
    ENDIF
    ENDIF
    IF Bool3=TRUE THEN
        PRINT EvalSub(10);
    ELSE
        PRINT EvalSub(12);
    ENDIF
    ELSE IF Bool1=TRUE THEN
        PRINT EvalSub(6);
    ELSE
        PRINT EvalSub(8);
    ENDIF
    ENDIF
    ENDIF
    (* print fields or "constants" *)
    IF LEFT$(EvalStr,1)=CHR$(34) THEN
        PRINT RIGHT$(LEFT$(EvalStr,LEN(EvalStr)-1),LEN(EvalStr
)-2);
    ELSE
        FOR x=1 TO Count-1
            IF EvalStr=Field(x).name THEN
                PRINT Field(x).text;
            ENDIF
        NEXT x
    ENDIF

    (* send char to stdout *)
    ELSE
        IF Char=CHR$(13) THEN
            PRINT CHR$(13)
        ELSE
            PUT #STDOUT,Char
        ENDIF
    ENDIF
ENDWHILE
SEEK #Path,0
FOR x=1 TO Count
    READ #Path,Template
NEXT x
ENDWHILE
END
```


to him. He assures me that the distributor's post office was the impediment.

Mike has since added a Gemini-10 option and provided a test copy. I tried it and returned the results in the afternoon mail. Also added since then is a wide Epson Print option and several new items in the tool box. All the *UltiMusE* data files have been concentrated in the SYS directory, which helps keep the data directory clean.

The new version of *UltiMusE* recognizes the older music files as such but nevertheless accepts them. There will undoubtedly be a new manual telling about all the new goodies. It looks like you have plenty of material for a follow-up story on this even better *UltiMusE*.

Fran Walters
Bethesda, Maryland

From English to German

Editor:

A friend of mine, a college German teacher, is looking for word-processing software with the capability of printing German and other European modified characters on the screen (without using the clumsy PRINT CHR\$). Are you aware of such software for the CoCo? The CoCo 3

has such characters built in (see Page 293 of the Color Computer 3 Extended BASIC Manual), but *Telewriter-64* with TW-80, the only word processor I know, doesn't access them.

James English
Kansas City, Kansas

Simply Better, currently sold by Danosoft, is available in a French version. Also, the IBM extended character set includes many European characters and Simply Better supports them for printers that include the set. You won't get single-key control of the characters, but you won't have to play with CHR\$'s either.

Support-Line Blues

Editor:

After I accidentally crashed my OS-9 System Master disk, I called Radio Shack about getting a replacement. The woman who answered said Tandy couldn't help me because OS-9 has been discontinued. She also told me the CoCo was becoming obsolete. There goes support from Tandy!

Chris Wynn
Monterey, California

As you have found, Tandy does have an exchange policy for disks damaged during

the warranty period. In addition, if you can't locate a discontinued Radio Shack software product, contact Tandy's Express Order System at (800) 321-3133. [We called Chris and learned he finally did get a replacement.]

At this point in time, your support counts more than anything else. You'll get as much (or as little) out of the CoCo Community as you put into it.

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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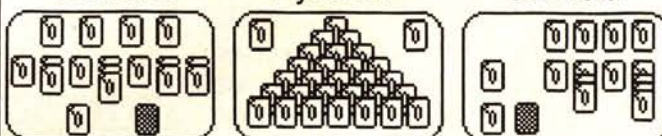
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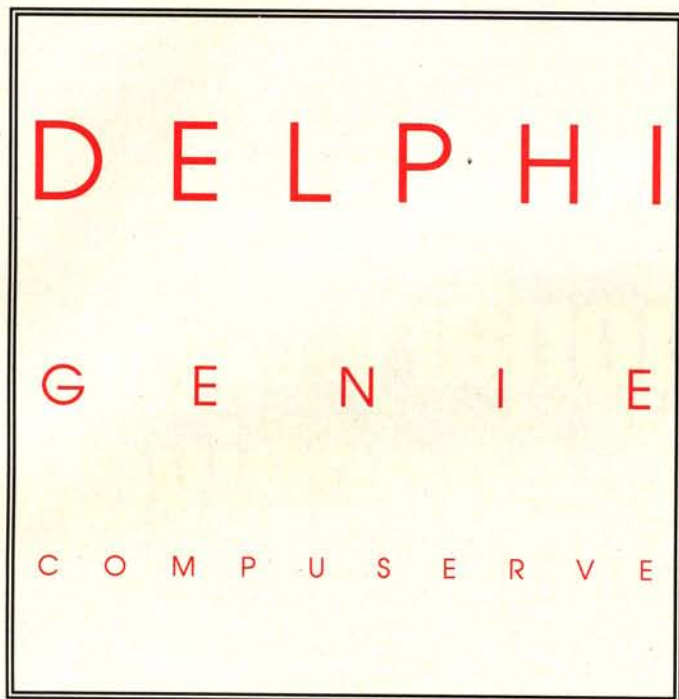
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Smart.

If you're thinking of buying an IBM™ PC, Amiga, or Atari ST, think again. Much of your CoCo hardware is useless on these computers. All of your experience is also useless — unless you acquire an MM/1.

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Novices Niche

Game 16K Extended

Addition

by Jerome Ebacher

Here's a program I wrote to give my son and daughter practice timing drills for addition and multiplication. My son and daughter had fits trying to learn their tables. I think it was the stress of being timed while trying to get the right answers more than anything else.

Addition uses a timing routine to approximate the teacher's clock, plus it gives positive rewards for speed. The program keeps track of cumulative earnings so the child can show on the screen just how much dear old Dad owes.

The display portion of the program comes from a one-liner I found in a RAINBOW a few years back. I'd give proper credit but I can't seem to locate that issue anymore.

Anyway, the kids like the program (or rather the reinforcement) and it has helped them overcome timing fright. But watch out, while my kids practiced and improved I had to adjust the level of rewards a few times to avoid going broke! All you have to do is change the statements in lines 110 through 140 and the amount of the S variable in each to correspond to the written statements. (i.e. S=S+.25)

My second grader had to do 36 random problems in under two minutes. Your child's requirement may vary. This can be adjusted by changing the value of P in Line 20. It is also easy to convert this program to multiplication by changing the appropriate +s to *s in lines 50 and 60. CoCo 1 and 2 users must remove Line 10 before running the program.

The Listing: ADDITION

```

(0) COPYRIGHT 1990 FALSOFT, INC
(10) ONBRKGOTO30
(20) CLS:PRINT@96, "NAME":;INPUT N
$
(30) P=36
(40) CLS:PRINT@355, "PRESS <ENTER> WHEN READY"
(50) TIMER=0:Y=0
(60) Q=0:R=0:PRINT@234, "ADDITION":
PRINT@297, "FLASH CARDS":EXEC4453
9:FORQ=1TO50:CLS:PRINT@0,Q:A=RND
(8)+1:B=RND(8)+1:IFA<=>B THENPRI
NT@240,USING"##":A:PRINT@271,"+"
::PRINTUSING"##":B:C=A+B:ELSEPRI
NT@240,USING"##":B:PRINT@271,"+"
::PRINTUSING"##":A:C=B
(70) PRINT@303, "—":PRINT@334, "—";
:INPUT D:IFD=C THENPRINT@448, "CO
RRECT":SOUND200,1:R=R+1:IF R=P T
HEN 90 ELSENEXT:PRINT@456,R:ELSE
PRINT@448, "TRY AGAIN":SOUND10,4:
GOTO80:PRINT@448, "CORRECT ":R:G
OTO90
(80) Y=Y+1:IFQ=P THEN 90ELSE 70
(90) CLS:PRINT@32*4, "NUMBER WRONG
OUT OF "P"—"Y:PRINT((P-Y)/P)*100
%"
(100) PRINTN$ " YOU DID IT IN:":PRI
NT USING"###.##":INT(TIMER/3640):
PRINT"MINUTES":PRINT USING"###.##"
;(TIMER/3640-INT(TIMER/3640))*60
:PRINT "SECONDS"
(110) IF TIMER<3640*1.5 THEN PRINT
N$ " YOU DID IT IN LESS THAN 1.5
MINUTES!!!! FOR THAT YOU GET FIF
TY CENTS$$$$$$":S=S+.50:GOTO150
(120) IF TIMER<3640*2 THEN PRINTN$
" YOU DID IT IN LESS THEN TWO MI
NUTES!!! FOR THAT YOU GET 25 CEN
TS $$$$$$":S=S+.25:GOTO150
(130) IF TIMER<3640*2.5 THEN PRINT
N$ " YOU DID IT IN LESS THAN 2.5
MINUTES!!!! FOR THAT YOU GET 10
CENTS$$$$$$$$$:S=S+.10:GOTO150
(140) IF TIMER<3640*3 THEN PRINTN$
" YOU DID IT IN LESS THAN THREE
MINUTES!!!!!! FOR THAT YOU GET
TEN CENTS!!!!!!":S=S+.10:GOTO150
(150) FORX=1TO1800:NEXT:PRINTN$ "
YOUR TOTAL WINNINGS THIS SESSIO
N ARE":S*100"CENTS"
(160) PRINT "PRESS <ENTER> TO CONT
INUE":;INPUT A$:GOTO40

```

<<< GIMMESOFT >>>

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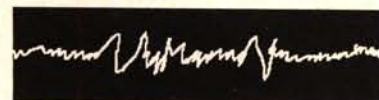
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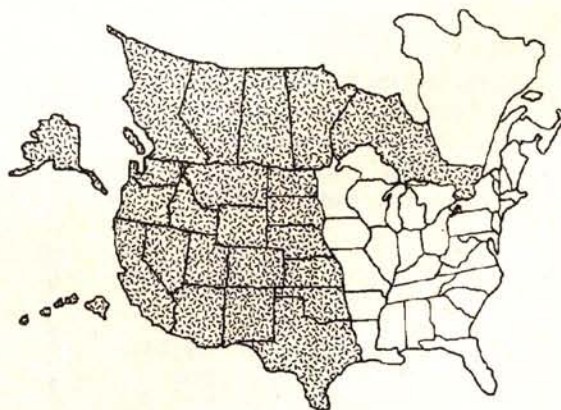
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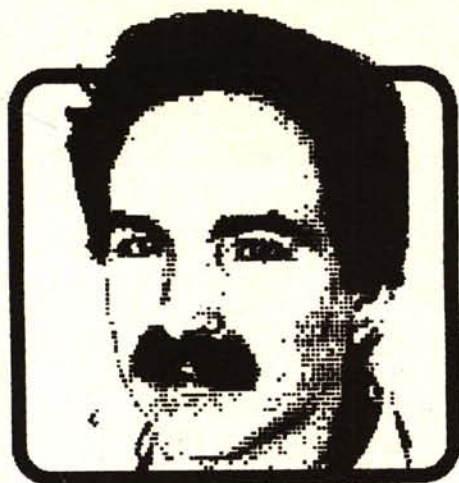


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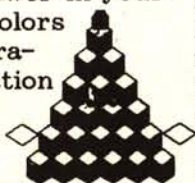
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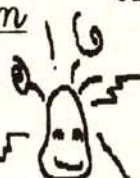
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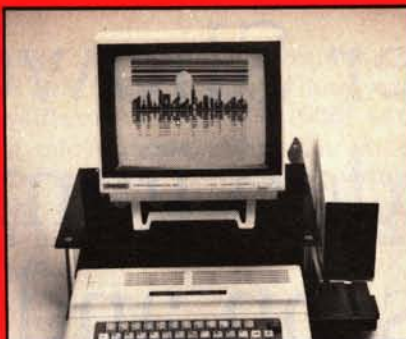
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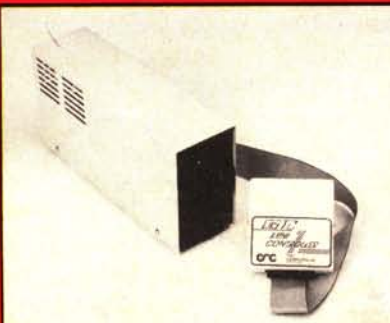
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- | | | |
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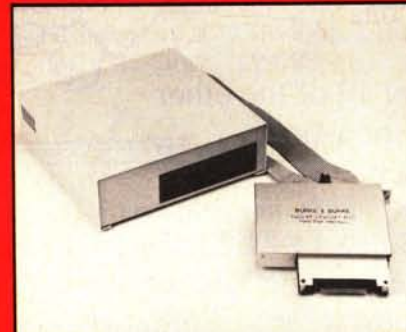
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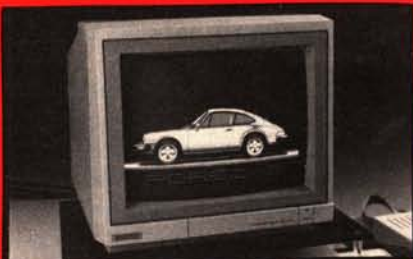
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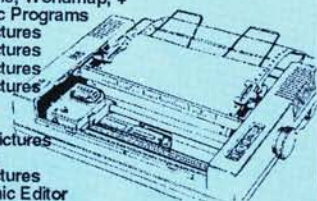
EDUCATION 1-4

- E1 - 12 Programs For Young Kids
- E2 - 12 Programs For High School Kids
- E3 - 11 Programs Teaching The Coco'S Commands
- E4 - 5 Graphics Programs About Australia



GRAPHICS 1-14

- GR1 - Atlanta, Cube, Space, +
- GR2 - Objects, Wargame, Worldmap, +
- GR3 - 9 Coco 3 Graphic Programs
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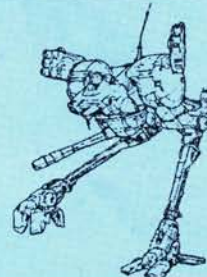
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- H2 - Cash Journal, Invest, Maillist, +
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GAMES 1-11

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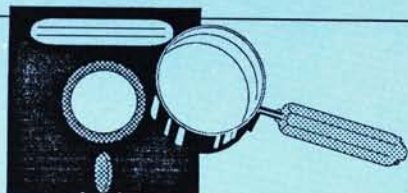
- GA1 - 3D Tic Tac, Missile, Poker, Tycoon, +
- GA2 - Amazing, Balloons, Motor Jump, Slots, +
- GA3 - Battleship, Golf, Lander, Zero G, +
- GA4 - ABM, LunarWorld, Protect, Subchase, +
- GA5 - Blackjack, Lazer, Tipan, Utopia, +
- GA6 - Kings, Maze, Shuffle, Tempest, +
- GA7 - Chess, City, Life, StarTrek, +
- GA8 - Chute, Germ, Hurtle, Lunar, +
- GA9 - Civil War, Go-Fish, Stock, UFO Maze, +
- GA10 - Cave, HiLow, Scramble, Word Hunt, +
- GA11 - Biorythms, Craps 3, Gunner, Martians, +



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M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
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